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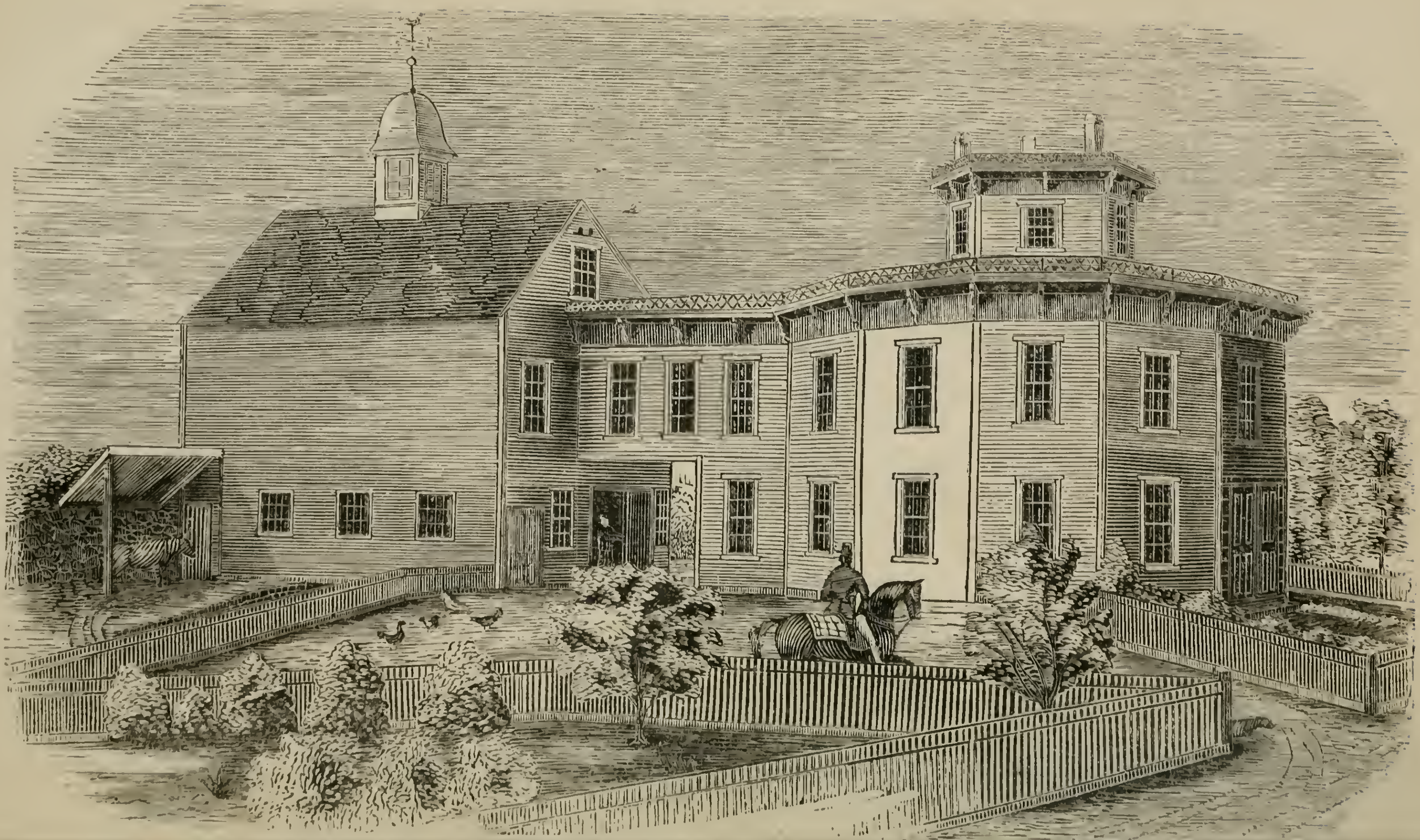

THE

COTTAGE BUILDER'S

MANUAL.

BY Z. BAKER.

> "INDUSTRY approached;
> His faculties unfolded; pointed out
> Where lavish Nature the directing hand
> Of Art demanded; showed him how to raise
> His feeble force by the Mechanic Powers;
> Gave the tall, ancient forest to his axe;
> Taught him to chip the wood and hew the stone,
> Till by degrees the finished fabric rose.
> . . . . HOME is the resort
> Of Love, of Joy, of Peace and Plenty, where,
> Supporting and supported, polished friends
> And dear relations mingle into bliss."

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THE FAMILY MANSION.

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INTRODUCTION.

As it is the object of this work to give the greatest amount of matter in the smallest possible space, a superfluous *preface* may be dispensed with, and the work, like that of the house builder, entered upon with the foundation construction, or a beginning made at the beginning.

The subject of house building is more than ever engaging the attention of all classes in the community; so that not merely those who build or perform the mechanical labor of a house study its character and construction, but those who propose to occupy it after its construction seek a voice in its arrangement. They feel, and justly so, that, as it is for them alone, they are the proper parties to decide how and what it shall be. True, ignorant peasants thus come in contact with enlightened architects; but it is equally true that the latter's duty in some degree is to instruct, and with a tolerant spirit seek to guide, the former. How frequent the inquiries, "What is the best plan of a house?—the cheapest and most convenient?" sometimes, "the prettiest?" These queries come, too, mostly from parties of quite limited means.

Such are the struggle and anxiety of the people for *homes.* The evils attendant upon renting houses, such as the apparent necessity of frequent removals, the want of interest we necessarily feel in that which is not ours, and the impossibility of feeling *at home* in a hired house, largely conduce to this strong feeling, discoverable every where, about *houses* and *homes.* This is the more fostered here, perhaps, on account of the *individualism* of our people, each man desiring to be a man in and of himself. So, too, the vast stretch of country open to the colonist proffers to each and all a home. Is it strange there is this feeling, this great desire for a *home,* a place occupied and possessed by one and the same party?

While all this is conceded, it is a fact that there are too few books of a practical character and sufficiently economical in price to meet the wants of the multitude thus interesting themselves in this matter. Nearly all the works published on the subject are too expensive for those who laboriously struggle for a comfortable living; they are good of their kind, being designed for the "master builder;" they are not adapted to the wants of other than artisans themselves. In some respects, too, they do not contain such plans as the larger portion of the people require; they give mansions for cottages, and villas for mechanics' houses.

This work is intended to meet the wants of all such as are seeking for a comfortable, convenient, or economical "house to live in," and it has therefore a variety of plans and styles of dwellings designed to meet these various wants prevalent with the multitude. A large portion are original with the compiler. Some are quite unique; and it is hoped nearly all will be found useful to those in the study of this subject, and if not just such as will be sought, yet sufficiently suggestive to direct the inquirer to the thing that will best suit. This, in fact, is the principal use of a book of this sort. This science is as yet but suggestive; and a plan like an essay should not suppress or satisfy inquiry, but inspire new ideas and open new fields of thought. In this way shall we have an increased conformity to nature, upon which this science should stand; and from this we should not deviate, while we may as far as possible study economy in construction, and convenience and utility in use.

The FIRST thing to be considered in the proposed erection of a house is the enclosure of a certain amount of space; the SECOND is the division of the space enclosed into the various rooms or compartments desired, so that each part can be allotted to its use, and not conflict with that of another. In our dwellings there are usually a parlor, second parlor, or sitting and dining room, a kitchen, and sleeping apartments, with halls, pantries, closets, &c., &c. Some may dispense with a first parlor, while others will add another.

With regard to the *form* of a house, that which will best divide into the apartments required should be taken. Circles inclose more space with the same wall; next, those forms nearest approaching them; then squares; and lastly, or most removed, or enclosing least, are oblongs. Examples are given of each and all. The circle divides favorably for dwellings; so also the twelve-sided; the octagon does not divide as well. Examples are given, and the reader can judge which suits best. Every house should be so constructed as to admit freely and fully, in all its rooms, *light* and *air* from without; and that form may be deemed best that best accomplishes this end, other things being equal.

Another important item is the relative situation of the rooms. If we are obliged to travel too far, or pass through rooms otherwise appropriated, in going from one part of the house to another, a wrong is at once seen; time and labor are lost in one case, and rooms perverted from their original use in the other. It has been a special aim to obviate these things in the plans submitted.

The internal arrangements should be such as to give every possible advantage to the occupants of a house. Let the rooms have as pleasant views as possible *without;* be as near as possible to each other, yet all separate and distinct; and above all, those rooms most used should occupy the pleasanter part of the house. The reader will see more of this under the head of *heating* and *lighting* our dwellings. People have been too much in the habit of living *behind* rather than *in* their dwellings, an evil yet needing further rectification. The question of a house, then, is, can all these items be combined, and yet not spoil the general effect of a dwelling as viewed from without? It is the compiler's opinion that they will so combine; and, as we have just said, plenty of light and air should be admitted into our dwellings; for these are the indispensable elements to health, and even to life itself. Every thing, therefore, pertaining to the use of dwellings should be taken into account in their construction. Utility has been taken as of first moment in the compilation of this work. It is proposed to give here some general, outside remarks, before the architectural constructions and plans are submitted.

SITES OF DWELLINGS. — Very much depends upon the choice of a site or spot on which to erect our dwelling. If a low or swampy place is taken, we get no good view of the surrounding country from it, and we shall be likely to have vitiated air to breathe, giving us disease in warm weather, and mud and frosts in winter and rainy seasons. If it is a fixed fact that *we live for enjoyment*, and a comfortably situated home contributes largely to this end, then no sensible or intelligent man has a right, in this age, to put a good house in a bad place unless from a plea of necessity, which can hardly be the case; and those whose sense of propriety does not carry them beyond a mere hovel for a home should not think of building, as we have enough of such already. A clean, airy, and prospective site is first to be sought. Our dwellings are the surest index of our civilization; and the ignorance that fixes houses or homes in miasmic or mud hollows, while there are enough better places to be had equally cheap, is more than deplorable. Such builders are proper subjects of civil guardianship. Give such places to frogs and ducks; but give men residences worthy of men.

A cheerful, lovely spot of ground for a house lot will do considerable towards insuring self-respect to the dwellers thereon. It is pleasing to see what nature and art are both doing to insure this end for man; yet the thing needs further and greater encouragement to general practice and success.

Extreme tops of hills are not to be chosen, especially if quite elevated. We can also upon prairies raise mounds for dwelling house lots at not a very severe cost. Farm houses should be central to the farm lands. An intelligent judgment and a refined taste (taste refined in Nature's own crucible) will seldom err in this matter. A love of trees, plants, birds, and animals seems inherent in our very nature. This is well; it is a perversion when we neglect to cultivate the former or when we destroy the latter. It is only wicked boys who kill the beautiful birds and destroy the plants and trees that offer their united services to make a good habitation for man. Morally, this subject increases in importance.

Those meditating a plan for a future home (and who without one is not?) will do well to give this subject a very careful consideration. It is easier to alter plans than houses, and much more convenient to move them about from place to place. This is a great subject, and requires much attention. Every variety of plan and place is to be considered, and generally the north side of a street will be preferable in northern latitudes; for, besides giving a "sunny side" front, it will encourage the *use* of the better part of the house more frequently than is usually the case, and not occupy an ell *behind* the house in preference to living *in* it.

Nearly allied with this subject is the *out-door* situation or fixings, a matter of at least second importance to the site. By this is meant the grounds about the dwellings, and their necessary fixtures, as gardens, fences, trees, shrubbery, flowers, walks, grass plots, &c., &c.

When it is considered how cheaply come all these things in the common view, is it not surprising so few avail themselves of them? The cost of a tree is but a trifle above the mere labor of setting. Nature will do nearly all the rest, and build up for us a noble, useful, and permanently beautiful structure, permitting us to call it our own, asking neither paint nor artists to patch up its beauty and glory. So much for *one*. Now add a dozen or a score, and the effect is heightened in nearly the same ratio. She cares for each and all, if you but confer the opportunity. Many persons expend largely upon their houses in special ornaments and filagree work, which require constant attention to preserve from decay, while all around these same dwellings there is neglect of the simplest ornaments nature affords. Nature, in her warm and genial influence, greatly excels the cold and often expensive works of art. Art is not to be set aside, but to be combined with Nature, to give us just such houses as give joy and satisfaction in use.

It seems necessary to intensify this subject to awaken that interest in it its importance demands. Is there a better cure for this evil than an encouragement, in youth, of a love of trees and flowers? Show them how far we depend on them for much of that we call life; inspire in them ambition to set trees and take care of them, to line the walks about the house with the choicest kinds of shrubbery and flower stocks, and in a little while a miniature paradise will spring up. Such a plan, too, will be the more a home to the family because it is the work of their own hearts and hands. This feeling, rightly encouraged and extended, would not only thus beautify walks and gardens about the homesteads, but in due time the highways and byways would be adorned with these enduring monuments of Nature — monuments that require little art of paint and chisel to preserve them for ages. Children, also, who grow up in such care are more likely to retain the integrity and virtue of childhood in mature years; their aims in life will be truer and higher, and patriotism almost alone here fostered and encouraged. Hence so little of this feeling in large towns by those reared therein.

Houses near villages and residences of gentlemen are more profusely adorned in this way, to be sure, for they have means, tastes, and leisure for it; but may not all have more or less of these ornaments? Fruit trees are often as good for this purpose as any. Want of time is not the real excuse; want of taste is the better one. Boys in a family find time to range the wide fields and forests, to kill little innocent birds; and girls, too, have seasons of leisure often not too well employed. Set all at work in this out-door architecture, and soon we will have added more real wealth than all California affords; more to enrich, more to adorn, more to make its inhabitants *contented* — the all-important thing after all.

Heating our dwellings in the cold seasons is found to be a great labor and expense. It is probably true too much dependence is placed upon artificial heat in order to render our persons comfortable. Inhaling greater quantities and purer air will in part remedy this, and probably greatly diminish the ravages of the insidious and destructive workings of consumptive disease, as it is called; yet we cannot well live without fire or heated rooms in our cold winter seasons. At the rate fuel is now consumed, we may well be alarmed for the future. Something is gained by the modern construction of houses; something more, perhaps, by the apparatus used for heating, as stoves of any and every sort, ranges, furnaces, &c., &c.; more still by a wise care of the fires we do have, for fuel is wasted in its use to a very great extent; and still further is there economy by graduating the manufacture of heat to just the required needs. Self-regulating stoves have been tried; air-tights in endless variety; but much yet remains to be done. Much waste of fuel among the rural population comes of using a cooking stove in winter for a common stove, and, as a consequence, twenty to thirty cords of wood are consumed, when less than half this amount would better serve them, if the sitting room were heated with an improved stove and the kitchen used for only its allotted object. The reason of this is obvious. The stove is not intended for heating, while it requires a large amount of fuel, and the kitchen is usually more open and exposed to cold from without. By using another room, fuel is saved and the greater comfort of the family is secured. By the use of extra funnel or heated pipes of water, various parts of a house are heated with a single fire; and when much space is required to be warmed, furnaces are used. It is not easy to decide which or what is best as yet. Something is yet to come; and the necessity of the case argues the nearness of the advent. Meanwhile it may not be ill advised to repeat that it is not good economy nor good morality to confine a family to a cold, open kitchen, while a parlor or second parlor is unoccupied, that might be made comfortable with one half the fuel wasted in a kitchen stove.

Lighting the house, especially by the sun, is a matter of some importance. A great error with many is admitting the light through the bottom of the window. This is like placing the astral lamp on the floor. Light should come down, so that the brow of the eye may shade the ball. It would be better to suspend our artificial lights overhead; every one knows how much better we feel under such circumstances. Is it because it is natural? and if so, right and best? The same rule applies for the light of day, which should be used as much as possible in lieu of any and every artificial light, both on account of its cheapness and superiority. Rooms used for sleeping apartments require to be fully lighted during the whole day. It has been found that light gives color to the blood, and the color is the life. The presence of light during the day in our sleeping rooms is as necessary as fresh air; therefore they should not only be of good size to contain sufficient air for breathing, but ample provision, by windows, and these uncovered, should be made. It is easily seen how the presence of light affects the growth of plants by just depriving them of it; and why not our sympathy and sorrow the more increased for the folly and wickedness that screens human forms and dwellings from the glorious sunlight?

The kind of material most desirable for artificial light may in part depend upon the use we are to make of the light.

For a centre table or suspension lamp we would require different articles from what would best serve for hard use. Gas, where it can be had, is the best light, and perhaps as cheap, considering the amount of light we get; yet this is only practicable in large places, where it is made in large quantities. Various substances are taking the place of what used to be oil, called by as various names. Turpentine and resin are ingredients largely used. These have in many cases proved dangerous, and they burn with an unpleasant odor, if not injurious to health. This matter, too, is open to the skill of man to discover something cheaper and better; and here the subject is left with the passing advice, make the most of that light that costs nothing, and is better than all, till a more near approach is made to it by the art and ingenuity of man.

Ventilation is a part of the study of those who would build, or have built for them, dwellings to dwell in. The motions of the air we breathe, and the causes of its changing from place to place, need considering. Every house should have facilities for passing the air through all its parts when in motion without, or even when necessary by artificial means when not in motion. The new appliances on railroad cars may suggest some methods for houses. The draft of a stove also indicates means of circulating air throughout our dwellings. Open a room in the lower part of the house, and connect it with one in the upper, and a current is formed. When the wind blows we can let the air in and out almost any house; but the necessity is greatest when the air moves the least. School houses, halls, lecture rooms, and all places where many persons assemble, require great care in this particular. Very few are yet, even where the thing is attempted, sufficiently ventilated. Rooms in which we long remain need most care in this respect. Bed rooms especially, in which most persons spend one fourth, and many even one half their time, are the rooms needing most care for ventilation; yet they actually receive the least, even in these days of educated physiologists and model architects. Any and every corner and attic large enough for man or boy to lie down in at full length, setting aside the width, is used to sleep in; and even in rooms of larger dimensions the head of the bed must be placed in the corner where the air circulates least or not at all. If there are to be any good sized, airy rooms in a house, let them be used for sleeping apartments.

We inhale, at the best, enough of the air that is vitiated by the exhalations from the body; and it will be found much dearer to pay the doctor than the carpenter; for the latter not only works for less pay, but he leaves us an airy room instead of a cramped stomach — a home instead of the wreck of a man. Some influence must be brought to bear on human conduct in this particular, else the present race will be the last with man; no hale, healthy children will rise up to call him "blessed." The author would not dictate any plan; it is enough to call earnest and special attention to the matter, when those who would live in the full enjoyment of body and mind may strive to conform to nature's laws.

PLANS AND ILLUSTRATIONS.

The object of a plan is to show how the space enclosed within the walls of a building may be divided or distributed into the various rooms or apartments of a dwelling. Houses are constructed to accommodate various classes of occupants, as well as diverse uses of the parts thereof; consequently there must needs be different sizes and forms to meet merely these purposes. Then there are a great variety of tastes and ideas with the same classes as to what is wanted for a house. It is thus we get the diversity of houses all over the country. The plans here given are more calculated to suggest than determine what specific one shall be adopted in any given case. After they have all been examined, the right one may be found by a combination of several or an improvement on either. It would have been easy and agreeable to the author to have greatly extended this collection of plans; but as some assignable limit must be fixed, a medium or perhaps moderate list only is given. There is also a wide difference of opinion and practice in the use of the rooms in a house. Some housewives are extremely careful, and nearly crowd themselves out of doors to save the room in a clean and parlor-like style; others make the whole quite common. Perhaps in this, as in nearly all extremes, a medium course would be best. Wisdom may not dictate a costly furnished room in the best and pleasantest part of the house to be used very infrequently, nor yet that there should be no parlors in which we can convene visitors and friends calling upon us, as the social life of civilized people requires.

People of wealth and distinction are wont to show their superiority in their dwellings; not that they despise or look down upon those less fortunate than themselves in these particulars. Probably a large portion of the now almost houseless would choose better dwellings if their means permitted. It is no disparagement to either class that some have larger and better dwellings than others. It is not the largest or most elegant house that is an index to the happiness of the occupants. It is a laudable ambition, however, that seeks a neat and comfortable dwelling, and proof that man has made an advance in coming out of the caves in the rocks, and the mere hovels and shelters of savage life; and this advance is in the right direction. Every season brings with it new proofs of this progress; each new edifice is an attempted improvement on the old; and though all new ones may not excel the old, it is evident great progress is constantly resulting from the labors and endeavors of man in this field.

Sometimes, from motives of convenience or economy, several parties unite and build double or triple houses. This is more frequently done where people crowd in together, as in large towns and villages. A few plans are given of this sort, though it is believed but few like to mix or mingle together in this way; and when two or more families do thus use a single building, they choose to have the tenements as nearly distinct and separate as possible.

There are several little conveniences out of or around the house that require at least a passing notice. These are fuel and utensil apartments, and such out-door sheds and rooms as may suit the convenience of parties using the house, gardens, and grounds about the dwelling. All tools need careful storage in a suitable and uniform place, so that they can be readily found at any time, and in a suitable condition for immediate use. The sties, poultry houses, stables, &c., are a part of the essential buildings of a complete homestead in country dwellings, and as such, here receive some little attention. They are, however, more simple, and require less care and expenditure of money than dwellings for man; still, convenience and beauty are not to be excluded from these less worthy appendages of the home of man. Some skill and care are required in properly locating these buildings, so as not to interrupt the harmony of the buildings, taken together. Those about to build should examine the buildings and grounds of those about them, as well as those given in the books. In this way there may be a better chance for the new structure exceeding the old than in any other way. The advice the author would give in the matter is, consult first the special wants or needs; then, in full conformity with these, superadd every other excellence and beauty the case can possibly admit. In selecting a plan, the amount of money to be expended is taken as a guide for the kind of house; then the style of building the funds proposed will give. After the size, &c., are determined upon, the question how the divisions of the space shall be made arises.

The illustrations preceding the plans in this volume are intended for the student of architecture, and are mostly taken from volumes of recent issue in London, and they will be found of great service to all in the practice of architecture; so, also, will the rules and tables of measurement gathered from various sources.

In a work of this kind, intended more to incite inquiry than to set down any results as already established, it may be proper to observe that in a home of one's own seeking, or one arranged to the taste of the dwellers thereof, it is not to be inferred that every house (may be, any) is to suit exactly the projectors, so that if another were planned, a mere copy would be the result. It is sometimes urged that in this matter of house building, so many tastes and minds are found, it is of little use to try to suit even one's self; and some go so far as to assert they have but little concern about it, even for their own use, merely on account of this diversity of opinion about houses. To such, any work of this kind can be of but little use, and if they are content with any thing of a house, then they are accommodated as things are. There are, however, so many otherwise affected, that we shall see yet many new kinds and styles of dwellings; to such these pages are addressed; and although but a small number of plans are given, they may yet answer a good purpose with such as are trying to secure comfortable and convenient houses, fitted up with neatness and good taste. Every man who builds a house for himself, should by all means have it arranged to his mind: in this way we shall have variety. But such a course will, after all, tend to secure a conformity to a higher standard; it is in this way progress is made.

We very naturally associate with a *house* a *home;* and a home is just and only the house we occupy, whether owned or merely hired. If it is true "there is no place like home,"—and it is not well to dispute such antiquated phrases,—a person without a home is a special object of commiseration. It is quite likely every youth, of whichever sex, most fondly cherishes the idea that a home is the special object of our destiny in this world, or a thing first to be secured, before the various other schemes of life are entered upon; and this home consists of *first* a house, and *then* its various surroundings. A home, and a happy home, are sometimes of extreme difference; though it is desirable all should be the latter, and, as has been hinted, those places our own hands have contributed most largely to produce, are more to us, for we partake more largely of such; so a home, more properly as such, is the place to which we are attached by birth and the impressions of early life, or else the one formed from our own ideas and labors. It is natural we should esteem our thoughts and acts as part of ourselves.

A *home* then, in either sense, is much, very much to us. If of the first named, we cherish too highly every part or item of the old shell to yield to alteration or demolition without powerful emotions of mind. We have learned to pass around its huge chimneys, and up and down its crooked stairs, and about and through its ill-arranged rooms, and know not but they are the most convenient in the world. A mind thus impressed is not fitted for improvement in this direction. In the other case, all we have done to perfect and beautify a place we are to call our home, tends, in an equal ratio, to bind us to that place. This is a beneficent law of our being. In view of these statements, it will be asked and urged, that as very many of our people are uneasy or dissatisfied with their homes, our reasoning is based on wrong views of what are, or may be, homes. Not at all; for while it is admitted that there is a vast amount of discontent, and that not only the *old homestead*, but even the newly-erected one, is freely offered "for sale," other reasons than a natural desire to part with either, must be taken into the account. When we have set down all that the spirit of adventure and speculation have done to effect such a state of mind, and find this deficient in accounting for the phenomena in question, then it will be time to call in question the laws we have named as securing and regulating a home. The avarice or perversion that *can sell* even a *mother's* picture can never fall back upon the slanderous assumption that one place is as good as another, and carry away with it all those noble monuments of human progress, our good houses. I know very well, the wife who truly loves her husband can and will follow him in the Indian forest trail, to prison, or death; but it is only that this love is stronger than the principle cited, that such strange freaks of fortune, or misfortune, occur. Mutual affection seeks mutual indulgence, and the true luxury of living will conform in all things to right methods of living, and these are only found in strict and full obedience to the laws of our being; and if this were the plan, it is hoped the reader sees no necessity for arguing a point so apparent, and therefore the whole can here be summed up. No man can be fully a man, and enjoy the blessings and privileges of life, who is destitute of a HOME; and those *without* a home are subjects of deep commiseration, either as too prodigal and profligate, or else wanting the common functions or mental powers necessary to a man, and thus become mere objects of charity, or servants. It is on the broadest ground we assume man's right to a *home* of some kind, and with the highest appreciation of his powers, that this home shall be as neat, and convenient, and beautiful as Nature herself.

What has been said about Home, as also most of the plans, refers to home in the country, where almost alone the genuine is to be found. In the town only the wealthy are able to possess land enough to make the house sufficiently attractive to enlist the sympathies and love of the occupants; and with this class, even here, almost the whole aim of the thing is thwarted by the employment of other hands to do the work or labor. Hence the garden of the opulent townsman is but little more to him than it is to the mere passer by — a spectacle, a thing to be seen merely. The mere idea of possession is not enough to make the garden or home what it should be to the dwellers thereon.

When a young man conceives the idea of a home, the house may be one of the first items, then its surroundings, &c.; but is there not a something back of all this? Yes, the real idea or thing sought in this matter is the same as that of procuring a coat or any needful garment; it is not the garment we live for, but the garment may help us to live. The better it is adapted to our wants, well fitting the person and otherwise comely in appearance, the more perfect we account it. So, also, the house is an ingredient of the home; the making of the house does not make the home in the proper sense, although it is very essential to a home. People often change (too often, perhaps) their places of residence, and of consequence their homes. A home, in so far as a house is concerned, is a place where the whole thing fits or suits those who occupy it; as, when the family is large, so must be the house to correspond, as a large person needs a larger garment than a smaller one. If the man has money and taste, he makes his house better or more costly, as his fancy may lead, while the man of smaller means governs himself accordingly. Both may live peaceably together if they will, seeing these distinctions are external to the men, and often but accidental to their history. It does not require a large or an expensive house to constitute it either beautiful or desirable as a residence. Each and every one will aim in these as other things of life, and as his calculations may be. When the real objects of life are seen and followed, then is the true mission of this world experienced.

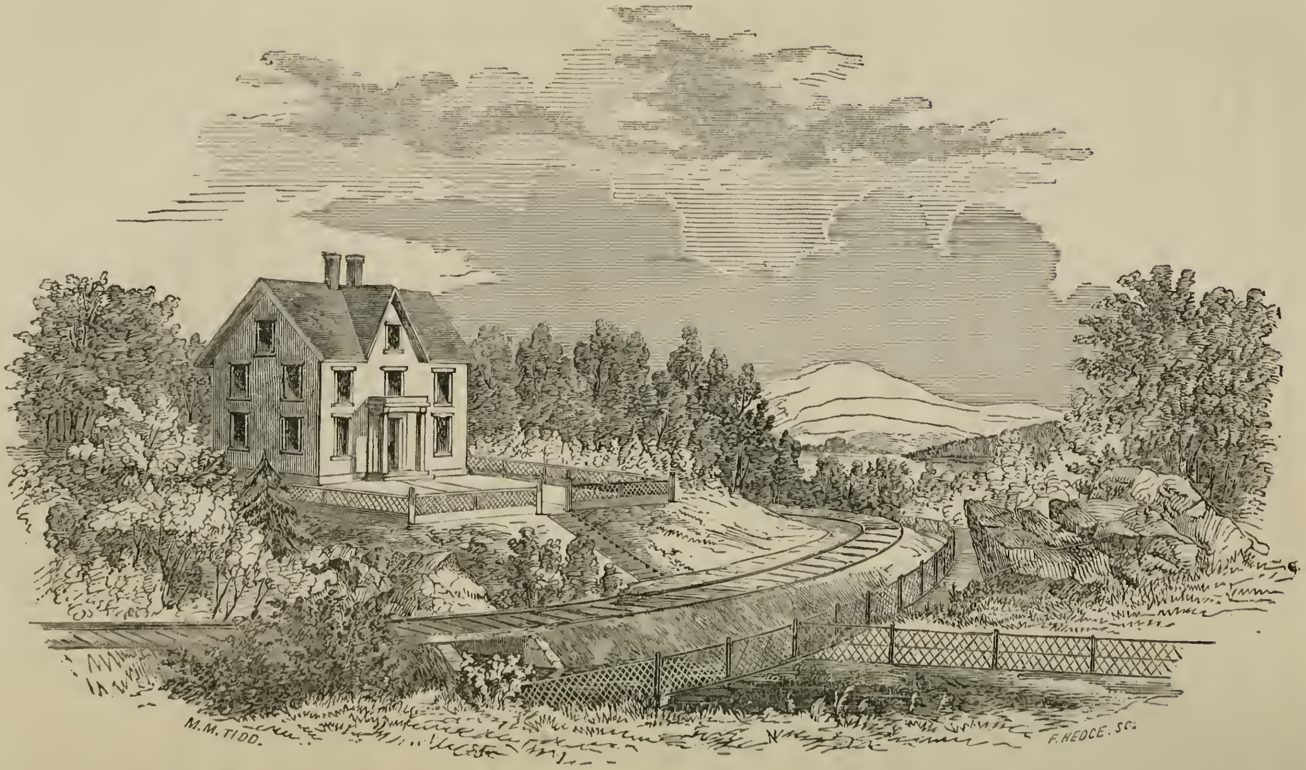
No one should live without some good object in view. It is usually esteemed a correct principle of judgment, that man attains the objects of his pursuits when his inspirations are sufficiently ardent. The young man aspiring to an education gets it, even in extremely adverse circumstances. So the man who desires any particular kind of a house or home will, pretty likely, live to secure it; and if this is true, the only reason why each and every one has not a home is, this natural instinct is suppressed in its action, or perverted by some wrong course of conduct. What now needs to be done is to make houses so comfortable, convenient, and happy, that the rising generation will see clearly that this is the right and only way to live, and then the race will come to conform to such natural mode of life as here indicated. A single paragraph will sufficiently indicate the author's views on this subject.

There is an item often named in works of this kind, which it may be proper to indicate the author's views thereupon, namely: the equipping of the house, or, in the common expression, the furnishing. It too frequently happens that this item costs as much as the house itself. It is desirable to have a house furnished with every thing that can render the service of housekeeping as agreeable as possible, and to this end, every needed utensil of the most approved sort should be secured, before any thing else is thought of; then in the ornamental part, use funds as you may have to spare. In the usual course of our present customs in society, that which is of least use to the individuals costs most to them, and vice versa. Now, as all wish to appear well in the sight of their friends, so, to conform to this idea in the undue development, we have every degree of extravagance, and in many cases, leading to great distress, if not bankruptcy. A neat, orderly house, if there be but few ornaments, containing cheerful and happy occupants, is better equipped to entertain visitants than the mansions of princes can usually afford. We feel at home the moment we enter, while those whose minds rest on fine furniture are all the while anxious lest we do not enough lavish our praises upon carpets, mirrors, &c. It has come to be an evil of no small magnitude, and which very much needs correction, that we cannot *use* without *abusing* the common privileges of life, and the domestic circle is not free from it. If we could rightly estimate life, especially life at home, where, if to be found, we should see it, it would not be difficult to distinguish between it and its appurtenances. Nor will we think the less of life, while it will be so much the more to us, when all else shall be subservient to life itself, being "more than meat," as "the body is more than raiment." It may afford pleasure to some persons into whose hands this will come, to suggest an improvement in the matter of beds, inasmuch as it is intimated we need large, airy bed rooms. As beds are now made, they are of but little use, except in the night time; if the frames (so cumbersome) could be arranged in parts, and during the day used as lounges or seats, like a sofa, it would be an improvement; and better still, to dispense with the feathers, as they usually emit an unpleasant, unhealthy odor. Why not make double lounges, to be rigged somewhat as above indicated? We might then dispense with much that in the usual way is costly, always exposed to dust, light, &c., and substitute therefor more economical coverings for beds, to be placed in closets as soon as aired, and leave the bed room free as a sitting room, or otherwise, as needed; and the labor, too, of making the bed would be greatly abridged, the room more easily cleaned, &c. We make the suggestion, as worthy of consideration.

As nearly all the houses built must be occupied by persons of moderate fortunes, there being but a very small portion of mankind strictly wealthy, or even likely to become so, it would seem that the houses of this class will be of moderate proportions, and of suitable economy in construction and equipment. It is specially advisable to all to live "within means," and as far as practicable to keep clear of debt. As a general rule, few prosper under the pressing weight of debt. If, then, so great a portion of human dwellings is to be of this character, it is all the more desirable that they should be as neat and convenient as possible; and much effect depends upon the trees, shrubbery, gardens, and grounds that surround the dwellings. If these are of the proper kinds, and arranged in the most suitable way, an ordinary house, otherwise, becomes, with these, a beautiful habitation of man, every way worthy of his origin and destiny. What has been intimated in regard to the rearing of children with the love and care of these elements of nature and art, deserves frequent repetition; and when once civilization sets this way, the beggarly poverty of our large towns will give its bone and muscle to this care and culture of the waste lands, and cause the deserts to blossom with roses, and the barren fields become rich with golden harvests. This will prove the only effectual drainage of cities of the superfluous population that give the municipal authorities so much trouble, and the whole body of inhabitants trouble and distress.

The plans for this class are from four to six or eight rooms, costing from three hundred to one thousand dollars. Eight hundred dollars rightly expended will give a very beautiful house. There is, throughout the country, such an abundance of waste land, it is matter of extreme lament it could not be turned to better account. Give every young man at all disposed to make himself a home, a few acres, on condition he will work out the problem. If our land monopolists would give or part with considerable portions of their lands on the same terms, the remainders would more than equal in value the first undivided portion; and better still, if, in the settlement of this country, lands had been limited to each possessor to an amount equal to his wants, and what he would use, and made free, our country would far have exceeded its present wealth and population, and the moral aspect of man in society would much exceed what we see at present. Is there not in this a great problem for the philanthropist and moral philosopher?

The cut on the following page illustrates a new and cheap kind of fence, made wholly of wire. It is calculated alike for garden and field, and seems better adapted to the purpose of fences than any thing yet devised. Made by James E. Butts & Co., successors to the Lowell Wire Fence Company, Boston, Mass.


M.M. TIDD.
F. HEDGE. SC.

COTTAGE BUILDER'S MANUAL.

DEFINITIONS AND CONSTRUCTIONS.

A POINT is that which has no parts; such is the true mathematical definition; it is thus merely an idea, not apparent to our senses; but to perform an operation we must have something obvious to these; it has therefore been agreed upon to represent a mathematical point, which has merely position, by a physical one, which has comparative size, and is generally made by the point of a pencil, a pin, or compass leg. The position from which a circle is described, as *a*, fig. 14, is termed a point; also the place where two lines, *a*, *b*, fig. 1, intersect or cut one another; it is in this case generally called the point of intersection.

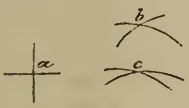


fig. 1.

A LINE is that which has length, but not breadth; it has been defined as the "flowing of points." A geometrical line is therefore made by joining a succession of points; and this is done by placing the edge of a ruler to coincide with the points, *a*, *b*, fig. 2, and drawing along it with a pencil or graver. A line is termed indefinite when it has no obvious termination, as *a*, *b*; finite when terminated

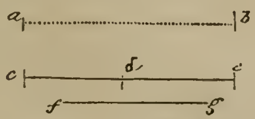


fig. 2.

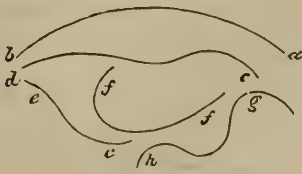


fig. 3.

by obvious marks, or supposed to have such, as *c*, *d*. A line is said to be produced when it is lengthened in the same direction; thus a line may only extend to *e*, fig. 2, but it may be produced to *d* or *c*. A circular line, *a*, *b*, fig. 3, is that which is continually changing its direction, and described by compasses from one point, which is termed its centre; the line forming a circle is a completed circular line. A CURVED LINE, *e*, *d*, is that which is drawn in more than one direction. In geometrical drawing, lines are used in two ways — "apparent" or "determined" lines, as *a*, *b*, fig. 4, and "occult" or "partial," as *c*, *d*. In general, occult lines are shown in diagrams as only useful in constructing them, but meant, after the operation is performed, to be rubbed out, the determined lines being left in. A line is said to be PERPENDICULAR to another, as *a*, *b* to *c*, *d*, fig. 5, when the angles on each side of the upright line are equal to one another. A line is said to be VERTICAL, as *c*, *d*, when it inclines neither to one side nor the other. It differs from a perpendicular line in the fact that it is always straight up; whereas a line may be perpendicular to another, and yet be itself much inclined; thus a ship's mast may be both vertical and perpendicular to the deck in time of complete calm, but if storms arise, and the vessel reels over to one side, the masts are no longer vertical, although still perpendicular to the deck; this distinction should be carefully noted. A HORIZONTAL line is that which is parallel to the horizon, or at right angles to a vertical line; *a*, *b* is a horizontal line. Lines that are

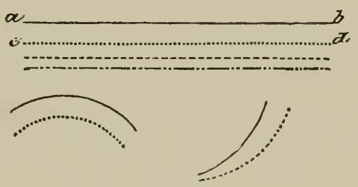


fig. 4.

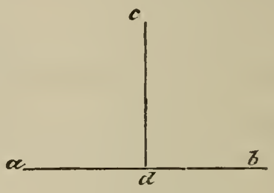


fig. 5.

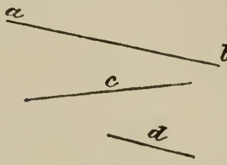


fig. 6.

neither vertical nor horizontal are said to be OBLIQUE, as *a*, *b*, *c*, and *d*, fig. 6. Lines that follow one another at equal distance, and which if produced ever so far both ways never meet, are called PARALLEL LINES, as *a b*, *c d*, *e f*, *g h*, fig. 7. Curved lines, as *a b c d*, fig. 8, may also be parallel and circular lines, *e f*, *g h*; these are termed also concentric, as in fig. 86 are two CONCENTRIC circles. The SIDES of a figure, or the BOUNDARY lines, are those within which the figure is contained, as *a*, *b*, *c*, *d*, fig. 13, are the sides of the figure *a b c d*; the line *c*, *d*, is called the BASE, on which the figure rests or is constructed. Lines that incline towards one another, as *a b*, *c b*, figure 9, and if produced would meet in a point, are angular lines, and form an angle, as the angle *a b c*, *c b a*; when the lines are right or straight lines, *a b*, *c b*, the angle is RECTILINEAL, but if curved or circular, as *f g*, *h g*, it is a CURVILINEAR ANGLE. When a perpendicular line cuts another, as *a b*, *c b*, fig. 10, the angle formed at the point of intersection is called a RIGHT ANGLE. If an oblique line meets a horizontal one, the angle formed at the point of intersection is either an acute or an obtuse. An OBTUSE ANGLE, *a b*

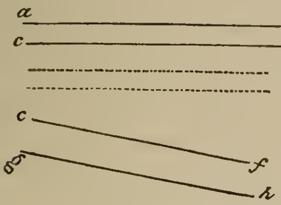


fig. 7

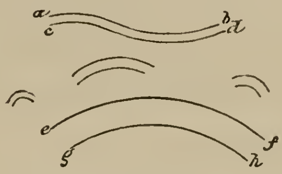


fig. 8.

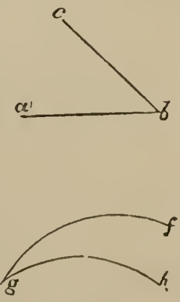


fig. 9.

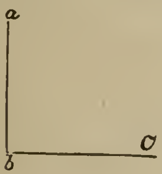


fig. 10.

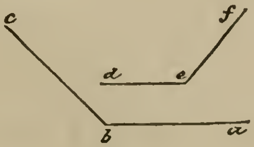


fig. 11.

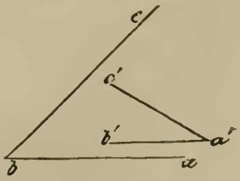


fig. 12.

c, fig. 11, being greater than a right angle, or more than ninety degrees; an ACUTE ANGLE, fig. 12, less than a right angle.

A SUPERFICIES, or SURFACE, is that which has length and breadth, but not thickness; hence it is that which is formed by boundary lines, as *a b c d*, *e f g h*, fig. 13. A FIGURE is that which is contained by three (fig. 19) or more (fig. 31) sides. A DIAGONAL is a line drawn across a figure, as *c b*, *f g*, fig. 13, joining opposite angles. Figures bounded by right lines are termed *rectilineal;* those by curved, *curvilineal.* A CIRCLE is drawn by placing one leg of the compasses in the centre, as *a*, fig. 14, and opening the compasses till the other leg reaches the point *b*; then cause this leg to revolve round the point *a* till it returns to itself; the distance by which the circle is described, as *a b*, is called the RADIUS, and the DIAMETER, as *c a b*, is double the radius; the boundary line is called the CIRCUMFERENCE. There are 360° in a circle, 180° in a SEMICIRCLE, *a d b*, fig. 15, and 90° in a QUADRANT, as *c a b*, fig. 16. The semicircle is described from the centre, *d*; the quadrant from *a*, two lines, *a b*, *a c*, being first drawn at right angles to one another. A SEGMENT, as *a*, *b*, fig. 17, is a portion of a circle contained by part of the circumference and a straight line joining its extremities, as *c d*, *e f*; this straight line is

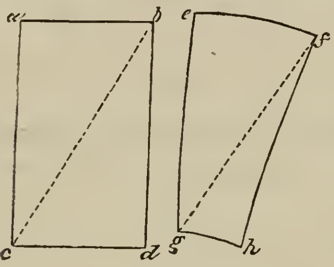


fig. 13.

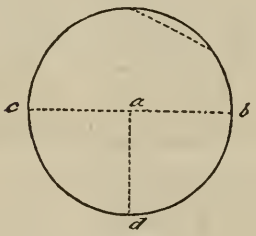


fig. 14.

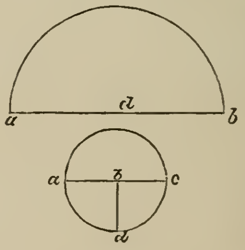


fig. 15.

called the CHORD, and an ARC is part of the circumference of a circle. A SECTOR is part of a circle bounded by two radii, or semi-diameters, as *a b*, *a c*, fig. 18, and part of a circumference.

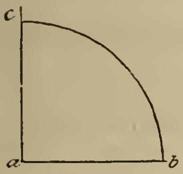


fig. 16.

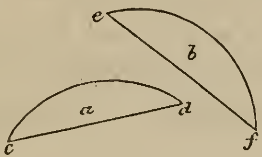


fig. 17.

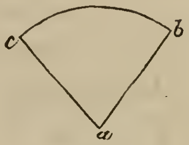


fig. 18.

An EQUILATERAL TRIANGLE is a right lined figure, having three equal sides, as fig. 19.

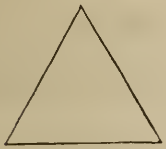


fig. 19.

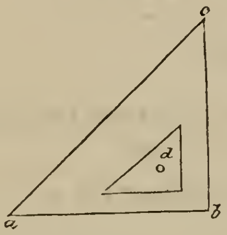


fig. 20.

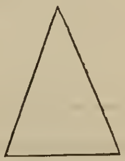


fig. 21.

A RIGHT-ANGLED TRIANGLE is that which has a right angle, as fig. 20; *a b* is called the base, *b c* the perpendicular, and *a c* the hypotenuse.

An ISOSCELES TRIANGLE is that which has two equal sides, as fig. 21.

An OBTUSE ANGLED TRIANGLE is that which has an angle greater than a right angle, as fig. 22.

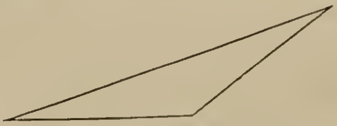


fig. 22.

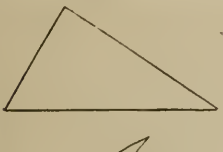


fig. 23.

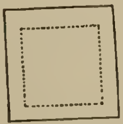


fig. 24.

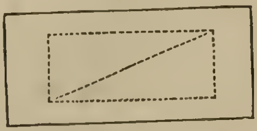


fig. 25.

A SCALENE TRIANGLE is that which has three unequal sides, as fig. 23.

A SQUARE is a figure contained within four equal sides, all the angles of which are right angles, as fig. 24.

A PARALLELOGRAM is a rectilineal figure, contained within four equal sides, two of which only are equal, as fig. 25.

A RHOMBOID is a quadrilateral, or parallelogram, but has no right angles, as fig. 26.

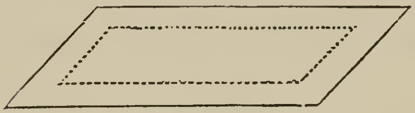


fig. 26.

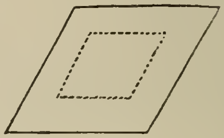


fig. 27.

A RHOMBUS is a quadrilateral, the sides of which are equal, but has no right angles, as fig. 27.

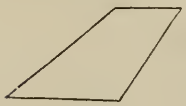


fig. 28.

A TRAPEZIUM is a quadrilateral, the opposite sides of which are neither equal or parallel, as fig. 28.

A TRAPEZOID is a quadrilateral, none of its sides being equal, but two parallel, as *a b c d*, fig. 29.

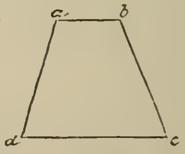


fig. 29.

A PENTAGON, *a e d c b*, is that which has five sides; it is of two kinds — equal sided and angled, as fig. 30, and irregular, as fig. 31.

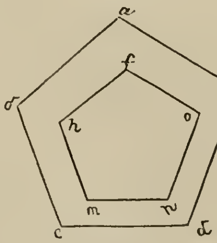


fig. 30.

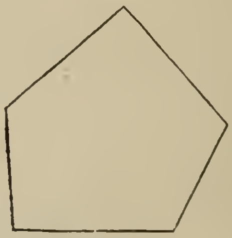


fig. 31.

A HEXAGON is a figure having six sides, *a f e d c b*; it is of two kinds — equilateral and equiangular, as fig. 32, and irregular, as fig. 33.

A HEPTAGON is a figure having seven sides; it is also of two kinds — regular, as fig. 34, and irregular, as fig. 35.

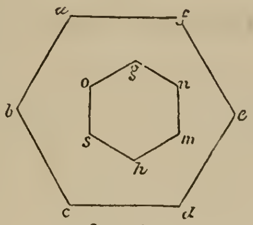


fig. 32.

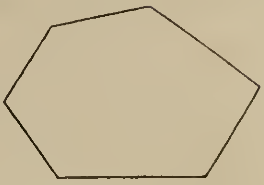


fig. 33.

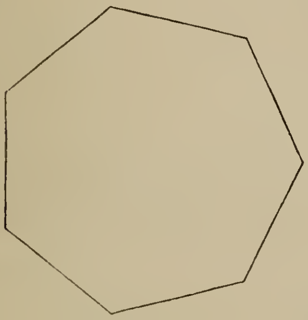


fig. 34.

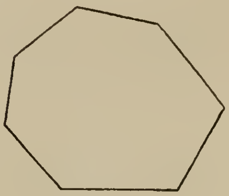


fig. 35.

An OCTAGON is that which has eight sides; it is of two kinds — regular and irregular; fig. 36 is a regular octagon.

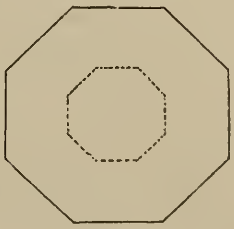


fig. 36.

A NONAGON is that which has nine sides; fig. 37 is an equal sided nonagon.

A DECAGON has ten sides; fig. 38 is an equal sided decagon.

An ELLIPSE, or OVAL, as it is more popularly termed, is produced by the section of a cone, *a c b*, by a line, *d e*, not parallel, that is, oblique, to its base, as shown in fig. 39. The largest diameter, as *a b*, fig. 40, is called the "transverse diameter," or "axis;" the shortest, *c d*, the "conjugate." The two centres, *e f*, are termed the "foci;" they are placed in the transverse diameter, at an equal distance from the conjugate. The "centre" of the ellipse is at the point of intersection of the two diameters. All lines drawn within the ellipse, parallel to one another, and bisected by a diameter, are called ORDINATES to that diameter which bisects them, as *h h*. The point where the diameters touch the circumference or boundary line of the ellipse, is called the "vertex." When the transverse diameter, as *a b*, is cut into any two parts by an ordinate, as *e*, the parts, *a e*, *a g*, are called "abscissa."

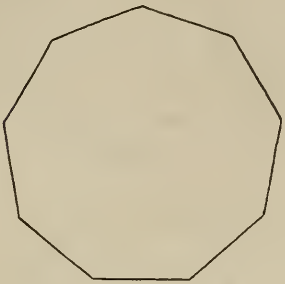


fig. 37.

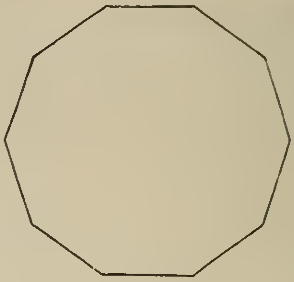


fig. 38.

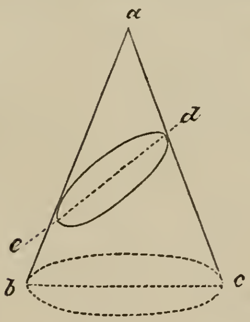


fig. 39.

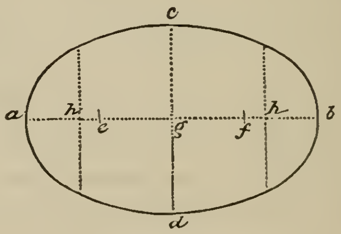


fig. 40.

A PARABOLA is the plane of a section of a cone, *a b c*, cut by a line, *d e*, parallel to one of its sides, as shown by fig. 41. A line, *a b′*, fig. 42, through the middle, is called its "axis," *c a d* the "directrix;" *e* is the "vertex;" all lines, as *f f*, that cut the axis at right angles are called "ordinates;" the greatest ordinate, as *b b*, limiting the length of the parabola, is called the "base;" right lines drawn within a parabola parallel to its axis, as *g′*, are called "diameters;" the ordinate drawn through the focus is called the "parameter;"

the abscissa is that part contained within the vertex and the ordinate, *b b*, which limits its length, as *e b′*.

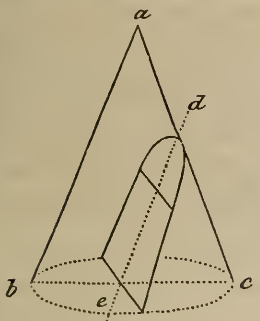


fig. 41.

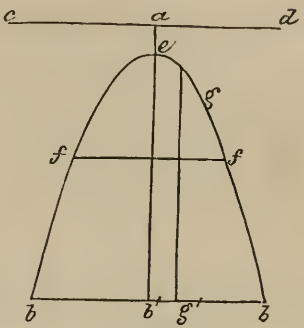


fig. 42.

The HYPERBOLA is a figure formed by the plane of a section of a cone, *c b d*, fig. 43, by a line either parallel to its axis, as *g*, or otherwise, as *e a*, so that if the cutting line be produced through one side of the cone, as at *o*, it may meet the other side of the cone if it be produced beyond the vertex *b*, as to *a*. The figure *h n o n m* is a hyperbola. The line *o g* drawn through the middle is called the "axis;" that part of it, as *o a*, which is produced till it meet the other side of the cone produced, is called the "transverse diameter." Ordinates are lines drawn within the figure at right angles to the axis, as *n n*; that ordinate passing through the focus is the "parameter;" the middle point of the transverse diameter is called the centre of the hyperbola; from this point lines can be drawn, which will approach nearer and nearer to the sides of the hyperbola, yet never really meet, however far the curve lines be produced; lines thus drawn are termed "assymptotes."

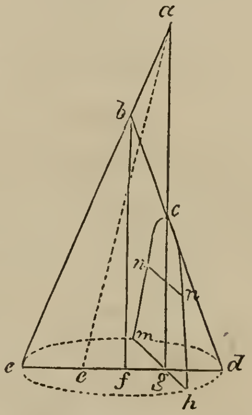


fig. 43.

The CONJUGATE AXIS is a line drawn through the centre of the hyperbola, terminated by a circle, drawn from the vertex of the curve; the radius of this circle being the distance between the centre and focus of the ellipse. The assymptotes are drawn from the centre through the terminations of the conjugate axis.

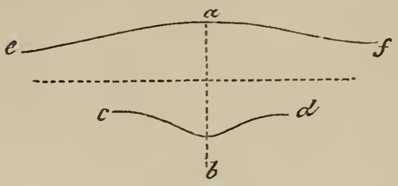


fig. 44.

The CONCHOID, a conic section or curve, discovered by Nicomedes, about A. D. 450, the properties of which will be hereafter described. In figure 44, which represents the curve, *a b* is the centre line, *f e* the "superior conchoid," and *d c* the "inferior conchoid."

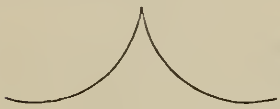


fig. 45.

The CISSOID, another curve or conic section, shown in fig. 45; it was discovered by Diocles, a mathematician, who flourished about A. D. 150.

The CYCLOID, a curve, generated in the following manner: Let *a b*, fig. 46, be a straight line, along which the circle *c d* rolls as a cart wheel does along a road; if the distance, *a b*, is equal to the distance which the circle rolls over in one revolution, or in other words equal to its circumference, the point *c* will trace out the curve, as shown in the diagram.

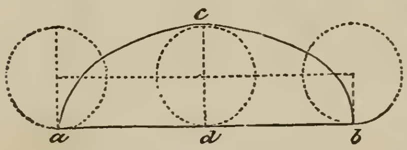


fig. 46.

TO CONSTRUCT A DIAGONAL SCALE FOR MEASURING LARGE DISTANCES.—Draw the line *c* 2, fig. 47, and divide it into any number of equal parts, as three; for use, the division should be eleven in number; divide the last division to the right hand into ten equal parts; from *c* draw *c d* perpendicular and equal to this, and divide it into the same number of equal parts; number these as at 2, 4, &c., these denoting 20, 40, &c.; the intermediate ones, 30, 50, &c. From *d* draw *d e* parallel to 2 *c*; from the points in *c d*, draw lines parallel to *d e*; through the large division in 2 *c* draw lines parallel to *c d*. Divide *d f* into ten parts, and from these draw to the division on *c* 2, as in the drawing. To measure

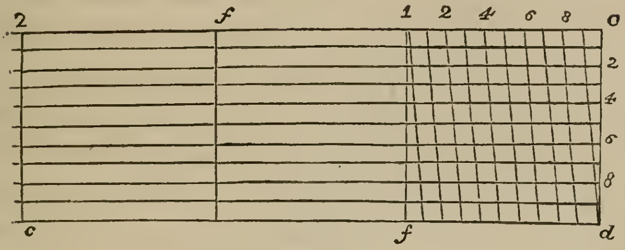


fig. 47.

distances from this scale proceed as follows; suppose the distance to be taken is 250; with compass point in the large division 2, open to the point 5 in the division to the right hand; to measure 165 — with point of compass in one, lay off to division 6; then, with point in this, bring down the leg in 1 to the 5th horizontal division; then move the point from six to the same division. In this scale the distances may have different values; thus the large divisions may be ten, while the small ones will be each one, or the large one hundred, and the small tens, or the large a thousand, and the small ones hundreds.

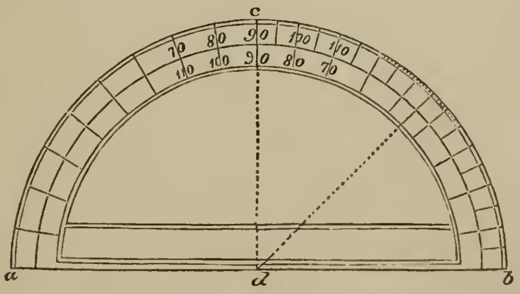


fig. 48.

To construct a square on a given line, *a b*, fig. 49. — From *a* and *b*, with radius *a b*, describe arcs to *c d*; from the point *e* of intersection with radius *e a*, describe a circle; with same radius, from *c*, *d*, cut the circle in *g* and *f*; draw *a g*; *b f* from *g*, *f*, with radius of the circle; cut these lines in *h i*; join *h i*; *a b c h* is the square required.

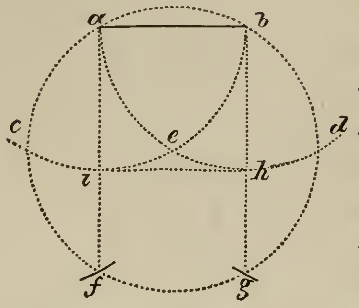


fig. 49.

To construct on a given line any polygon having from six to twelve or twenty-four sides.—Let *a b*, fig. 50, be the line from *b*, with *a b*; describe an arc, *a e*; bisect *a b* in *c*, and erect an indefinite perpendicular, as *c e*; divide the arc *a e* into six equal parts; from *e* transfer these to the line *e c*.

To construct a hexagon.—On *a b*, from *e*, with radius, *e a*, describe a circle. This will contain *a b* six times. For a heptagon, octagon, nonagon, (nine-sided figure,) decagon, (ten-sided,) undecagon, (eleven-sided,) dodecagon, (twelve-sided,) the centre of the circle is respectively at the points 7, 8, 9, 10, 11, and 12. A polygon, having from twelve to twenty-four sides, can also be constructed by the same means—by dividing the arc into twelve equal parts, and proceed as above. In fig. 50, *f* is the centre of a circle, containing *a b* five times. The sides of a regular pentagon, hexa-

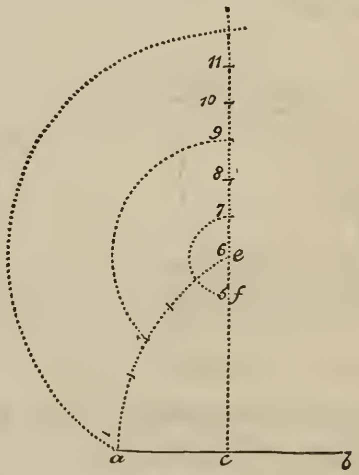


fig. 50.

gon, &c., can be found by means of the protractor. The rule (fig. 48) is simple. Divide 360°, the number of degrees on the circumference of a circle, by the number of the sides of the desired polygon. This will give the angle at the centre of the circle, in which, or about which, the figure is to be inscribed or described. If the figure is to be constructed on a given line, the angle found as above is to be subtracted from 180° ; the angle thus found is that to be used. All the other figures can be constructed by the rule given above.

TO DESCRIBE AN OCTAGON ABOUT A SQUARE. — (Fig. 51.) — Draw diagonals, cutting in *e* ; from *e*, with *e b*, describe a circle ; bisect *c d*, *c a*, in *f* and *g* ; from these draw lines through, meeting the circle ; join the points.

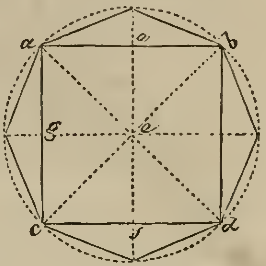


fig. 51.

TO DESCRIBE A HEXAGON ABOUT A HEXAGON. — (Fig. 52.) — Produce *a b*, *c d*, to *e* ; bisect *b e*, *d e*, in *f g* ; draw from *b* and *d* through these, cutting in *h* ; from *m*, the centre of the given hexagon, with *a h*, decribe a circle ; bisect all the sides of the hexagon, as *a b*, *c d* ; through the centre *m* from these draw lines, touching the circle ; join the points.

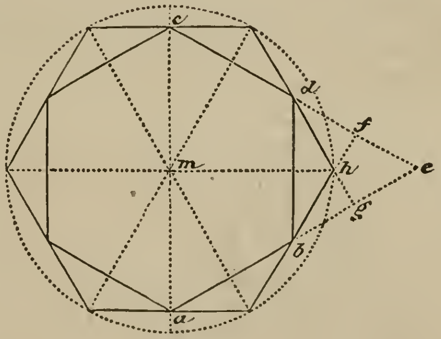


fig. 52.

TO DESCRIBE A SQUARE ABOUT AN EQUILATERAL TRIANGLE. — (Fig. 53.) — Bisect *b c* in *d* ; draw *d a* ; produce *b c* ; make *d e*, *d e* = *d a* ; join *e a* ; from *d*, with *d c*, describe *c f b* ; from *f*, through *b c*, draw to *h g*.

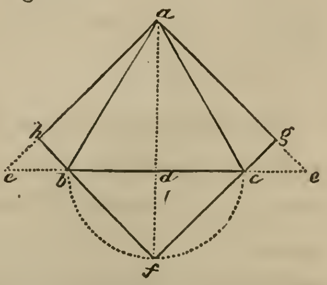


fig. 53.

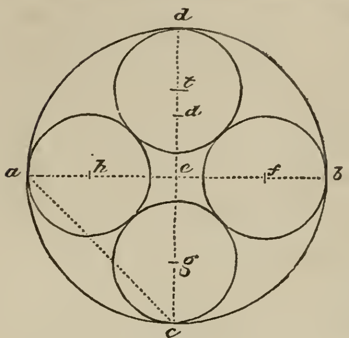


fig. 54.

To inscribe four circles within a circle. — (Fig. 54.) — Draw diagonals, cutting in *e*; join *a c*; from *c*, with *a c*, lay off on *c d* to *d*; with *d c*, from *a b c d*, lay off in the diameters to *g h t f*; with radius *f b* describe from these points the four circles.

To inscribe three circles within an equilateral triangle. — (Fig. 55.) — Bisect the sides in *d e f*, and from these draw to the opposite angles; with *a d*, from *e f d*, lay off to *m n o*; describe from these the three circles. Note. — By joining the points *m n o* by lines a triangle may be inscribed within the other.

To inscribe four circles within a square. — (Fig. 56.) — Bisect the sides, and draw lines from the points, cutting in *e*; join *a c*; from *c*, with *c e*, cut *a c* in *d*; with *d a*, from *a b c d*, lay off in the diameters; these are the centres of the circles of which *a d* = radius.

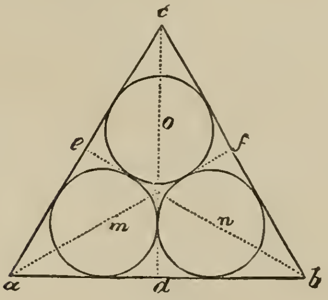


fig. 55.

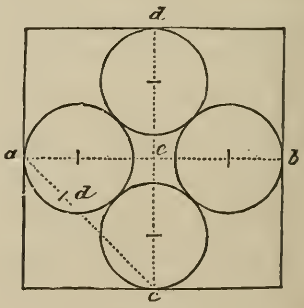


fig. 56.

To describe an ellipse in a given line. — (Fig. 57.) — Divide *a b* into three equal parts; from *c d*, with *c a*, describe two circles, cutting in *e*; through the centre and the points of intersection draw lines, as *c f*, *d e*; from the point of intersection take to *f* in the compasses; from the points, as *e*, describe parts of circles joining the small ones previously described, as *f f*. *Meth. 2nd,* (Fig. 58.) — Divide the line *a b* into four equal parts; from *c d*, the first and third, describe, with radius *a c*, two circles; from *c d*, with *c d*, describe arcs cutting in *e*, on both sides of *a b*; from *e* draw through *d* to *g*, with *e g*; from *e* describe parts of circles joining those previously drawn. *Meth. 3rd — the diameters being given.* — (Fig. 59.) — Let a' b' be the diameters; draw $a b = a'$; bisect it in *e*; draw *e a*; $d c =$ half of b'; *d c* will therefore equal b'. Take *c d*, and from *d* lay it on *a b* to *f*; divide *f b* into three equal parts; with two of these from *e* lay on *a b* to *g*; make $e h = e g$; from *h g*, with *h g*, describe arcs in *m n*; from *h g*, with *a h*, describe parts of circles *a b*; from *m* draw through *g*, touching the circle described from *g*; from *m n*, describe arcs as in preceding problems. *Meth. 4th.* — Let *a b*, *c d*, fig. 60, be the diameters. With *c e* from *b* lay off to *f*; divide *f c* into three equal parts; from *f*, with one of these, describe a semicircle to *h*; make $e g = e h$; proceed as in last problem. *Meth. 5th.* — An ellipse may be described without compasses, on a large scale, as follows: Let *a b*, fig. 61, be the

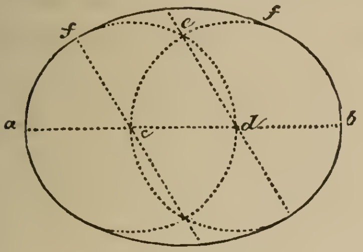


fig. 57.

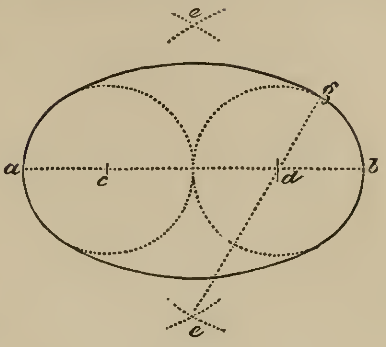


fig. 58.

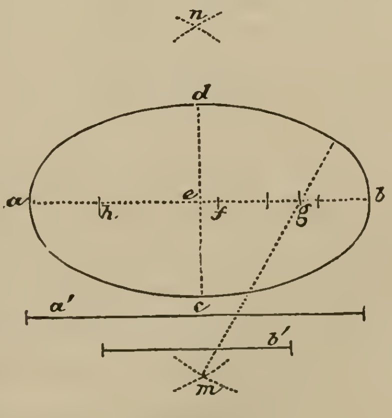


fig. 59.

length of proposed ellipse, and *c d* half its breadth; bisect *a b* in *c*; draw *c d* perpendicular to it; with *a c*, from *d*, cut *a b* in *e* and *f*, in *d e f* fix pins; fasten a cord round *e*, carry it round *d*, and fasten it firmly to *f*; take out the pin *d*, and substitute for it a pencil or tracer; keep the cord tight, and from *d* towards *a* move the tracer, and from *d* to *b*; half of the ellipse will be described; move the cord to the other side of the pins for the remaining half.

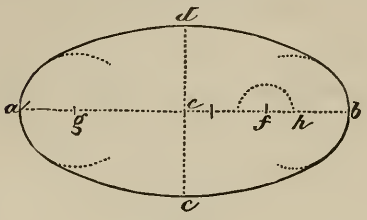


fig. 60.

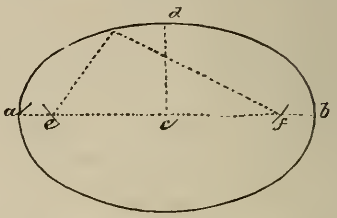


fig. 61.

To DRAW AN ELLIPSE ROUND TWO SQUARES. — (Fig. 62.) — Let *a b c d*, *e f d c* be the squares; draw the diagonals as in the diagram; from *g* and *h*, *c* and *d*, describe the parts of the circles, joining *a b*, *f e*, *f a*, *e b*.

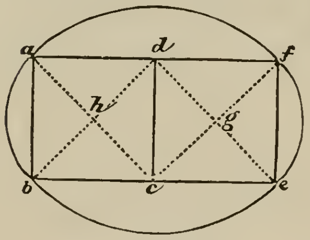


fig. 62.

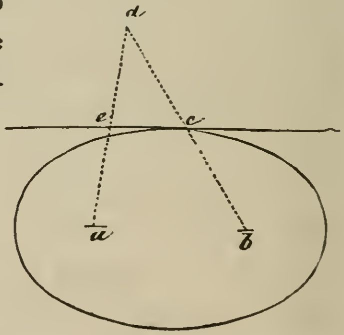


fig. 63.

To DRAW A TANGENT TO AN ELLIPSE. — (Fig. 63.) — Let *c* be the point of contact, and *a b* the FOCI; from *b* draw a line through *c*; make *c d* = *c b*; join *d a*; bisect it in *e*; from *e* draw through *c*; *e c* is the tangent. *Meth. 2nd.* — (Fig. 64.) — From *a b*, the foci of the ellipse, to the point of contact at *c*, set off in *c a*, *c d* = *c b*; from *b* draw through *d*; draw from *c* a line parallel to *b d*; it is the tangent required.

AN ELLIPSE BEING GIVEN, TO FIND ITS "FOCI" AND DIAMETERS. —(Fig. 65.)—Draw any two parallel lines, as from *a b*, *c d*; bisect them in *e e*; draw *e e*; bisect it in *f*; *f* is the centre of the ellipse; from this, with any radius greater than half the supposed conjugate diameter, draw the circle *p b c*, cutting the ellipse in *h m*; join *h m*; bisect it; through the point of bisection and *f* draw a line *o o*; this is the transverse diameter; through *f* perpendicular to *o o* draw a line, meeting the ellipse; this is the conjugate diameter; bisect *f o* in *s*; make *f s* = *f s*; on both sides the conjugate, *s s*, are the foci.

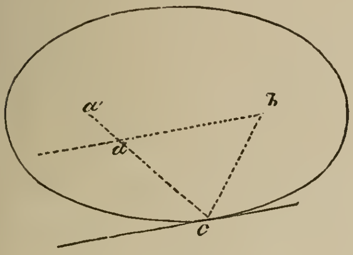


fig. 64.

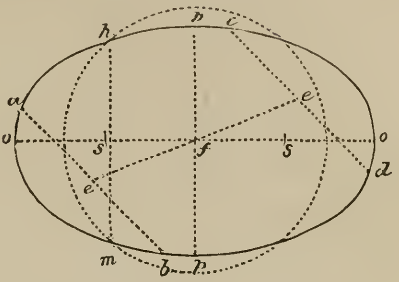


fig. 65.

TO DESCRIBE AN ELLIPSE ON THE LARGE SCALE BY MEANS OF POINTS.—(Fig. 66.)—Let *a b*, *c d* be the two diameters; with *a e*, from *c*, lay on *c d* to *g*; from any point *m* between *e g*, with *e g*, cut *e b* in *n*; from *m* through *n*, draw a line, and make this from *n* = *e d*; the point thus found is in the curve of the ellipse; any number to complete the curve may thus be found. *Meth. 2nd.*—Let *a b*, fig. 67, be half the

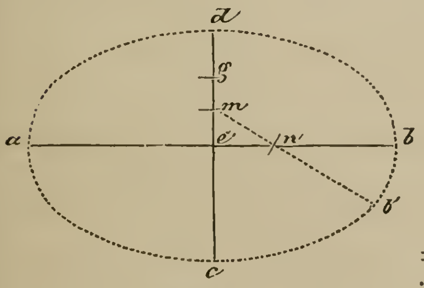


fig. 66

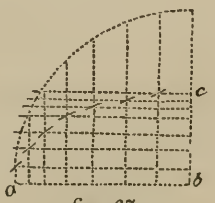


fig. 67.

transverse, and *b c* half the conjugate diameter; draw *b c* at right angles to *a b*, and produce it indefinitely; from *b*, with *a b*, describe the quadrant. Divide *a b*, *b c*, into the same number of equal parts, and from these draw lines parallel to *a b*, *b c*; through the points where the corresponding lines intersect, as the first from *b*, with the first from *c*, draw a curve by hand; this is one quarter of the ellipse; the others may be produced in like manner.

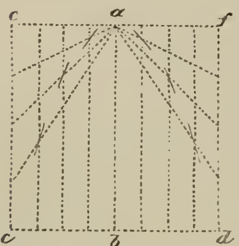


fig. 68.

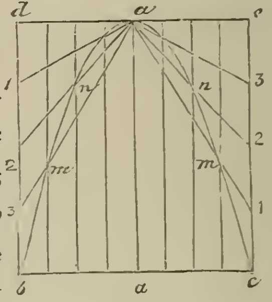


fig. 69.

THE BASE *c d* OF A PARABOLA, AND ITS ABSCISSA *a b*, BEING GIVEN, TO FIND THE CURVE. — (Fig. 68.) — From *c* and *d* draw lines to *e f*; through *a*, parallel to *b d*, draw *e a f*. Divide *c b*, *b d*, each into any number of equal parts, as four; also *c e*, *d f*. From the points in *c d* draw lines to *e f*, parallel to *c e*, and from those in *c e*, *d f*, to the vertex *a*; through the points where the corresponding lines intersect, as the first from *c*, with the third from *e*, draw by the hand the curve required; the various points may be correspondingly numbered to facilitate the operation. Fig. 69 gives another diagram, showing this construction — *a b*, *b c*, divided each into four parts, as also *c e*, *b*; the points *n*, *m*, *n*, *m*, are those through which the curve is drawn. In fig. 70 another method is shown. Draw the line *a b*, *c d*; divide *a b* into five equal parts; through these draw lines to *d e*, *c f*; from the points on *d e* draw lines to *a*, and from *c*, through the points on *a b*, meeting those; through the points thus obtained draw the curve by hand.

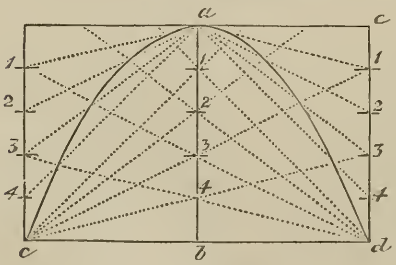


fig. 70.

A PARABOLIC CURVE BEING GIVEN, TO FIND ITS FOCUS, DIRECTRIX, AND PARAMETER. — (Fig. 71.) — Draw any two parallel lines, *a b*, *c d*; bisect them in *e e*; draw a line *e e* through these; this forms a diameter; at right angles to this draw any line *f h g*; bisect it in *h*; draw *h m o*; join *m f*; from *f*, at right angles to *m f*, draw a perpendicular, cutting *m n* in *n*; divide *h n* into four equal parts; lay one of these from *m* to *p* and *o*; *p* is the focus; through this draw a line parallel to *f g*; it is the parameter; a line through *o* parallel to this is the directrix.

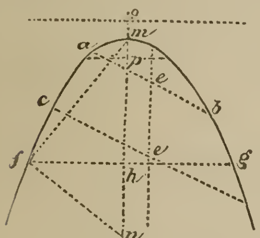


fig. 71.

TO DRAW A TANGENT TO A GIVEN POINT IN THE CURVE OF A PARABOLA. — Let *a*, fig. 72, be the vertex, the point of contact, and *c* the point where the tangent will intersect the parabola's axis produced: from *d* draw the semi-ordinate, *d e*; at right angles to *b e*, draw *a c* = *a c*; *d e* is the tangent.

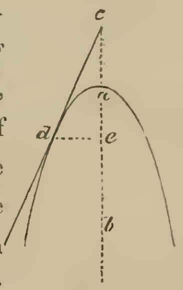


fig. 72.

TO DRAW THE CURVE OF A HYPERBOLA, THE CENTRE *d*, FIG. 73, THE VERTEX AND ORDINATE *d c* BEING GIVEN. — Draw *a b* through the vertex; draw *e*, *f*, and from *a b* parallel to *d e*,

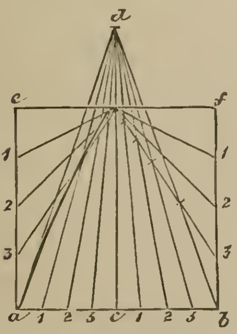


fig. 73.

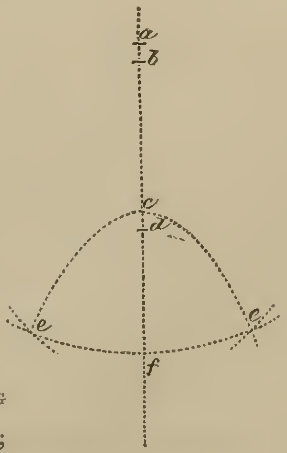


fig. 74.

a e, b f; divide *a c, c b* into any number of equal parts, as four, and draw from these to the centre, *d*; divide *a e, f b* into the same number of equal parts as *a b*, namely, four, and draw from these to *e*, through the points where the corresponding lines intersect; draw the curve by hand.

To DESCRIBE A HYPERBOLA BY MEANS OF POINTS. — Draw any indefinite line, *a f*, fig. 74; set off on it the transverse *b c*. Let *d* be the focus; equal to *d c*, from *b* set off to *a*; from *a*, with any radius greater than *b a*, describe an arc; from the radius take the transverse *b c*; and with this difference as a second radius, from the centre *d* describe another arc, cutting the former one in *e e*. By this means any number of points may be found; the nearer they are the better.

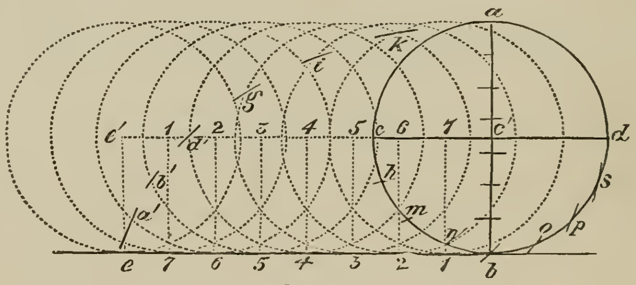


fig. 75.

To DESCRIBE THE CURVE " CYCLOID. — Let *a b c d*, fig. 75, be any circle; at right angles to *a b*, draw any line *b e*; make this equal to half of the circumference of the circle *a b c d*; this will be quickest done by dividing *a b* into seven equal parts, and making *b e* equal to eleven of these; the proportion the circumference of a circle bears to the diameter being as 22 to 7. Divide *b e* into any number of equal parts, as eight, and number them as in the diagram; make *e c'* at right angles to *b e*, and equal to *b c'*; draw *c' c'*, and divide it into the same number of parts as *b e*; from each of these parts as centres, with radius *b c* describe circles; from the centres draw lines to the various points on *e b*. Divide *d b c*, half of the circle, into as many parts as *b c* is divided into; then, with radius *c h*, from the point 7 on *b e* cut the circle described from the point *e*; then, with *c m*, from the point 6, cut the circle described from the point 1 on *c e*, in the point *a′*; in the same manner with the distances *c n*, *c b*, *c o*, *c p*, *c s*; from the various points in *a b*, cut the circles in the points *b′*, *d′*, *g*, *e*, *i*, and *h*; through the points thus found draw the curve.

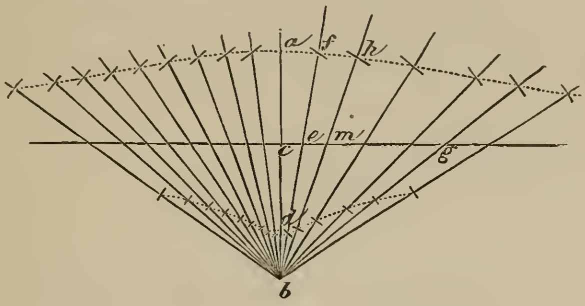


fig. 76.

To describe the curve conchoid.” — Draw any two lines, as *a b*, *g e*, fig. 76, at right angles to each other; from *b* draw any number of straight lines, as *d*, *e f*, *b m h*, *b g*; make on the line *a b*, *c d* = *c a*; and on each of the lines drawn from *b*, take *e d* = *e f*, *m h* = *a c*, and so on; through the points thus obtained draw the curves; the upper curve, *f*, *h*, is called the “superior conchoid;” the lower one the “inferior conchoid.”

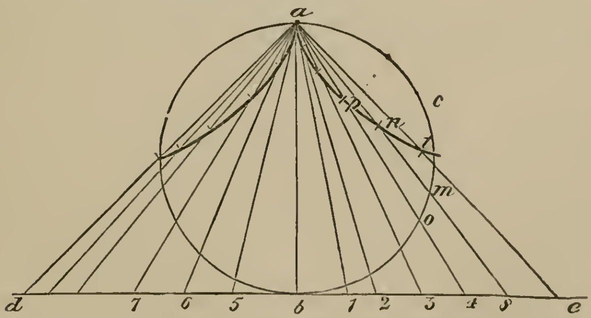


fig. 77.

To describe the cissoid. — Let *a b c*, fig. 77, be a circle, and *d e* any indefinite line touching it at *b*; from *a* draw any lines to points on the line *d e*, as to 1, 2, 3, 4, 5, 6, 7, and so on; with the distance *a m*, cut the line 8 *a* from 8 in *n*, and from 4, with *a o*, cut *a* 4 in *p*, and so on. Through the points thus found, on each side of *a b*, draw a curve as in the diagram.

To draw a spiral on a given line. — (Fig. 78.) — Let *a b* be the distance between each convolution; divide *a b* in *c*; from *c*, with *c b*, describe the semicircle *b a*; from *b*, with *a b*, the semicircle *a d*; from *c*, with *c d*, the semicircle *d e*; from *b*, with *b e*, to *f*; from *c*, *c f g*; from *b*, with *b g*, to *b*; from *c*, with *c b*, to *m*; the spiral is complete.

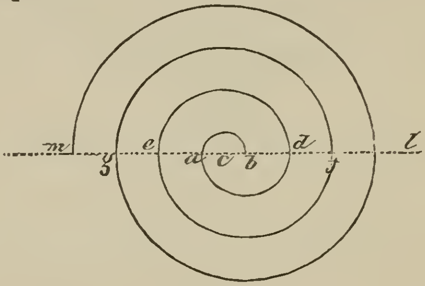


fig. 78.

Having thus fully explained the various methods of performing useful Geometrical Constructions, we shall now show their application to Architectural Drawing.

Note. — A careful study of these forms will prove very useful to the student of architecture.

GEOMETRY

APPLIED TO

ARCHITECTURAL DRAWING.

We shall first notice, under this division of our work, the methods of describing the various "Mouldings" met with in architectural productions. We shall take them as near as possible in the order of their general sequence. The first we notice is the "FILLET," shown in fig. 79; this is so simple that it requires no particular instructions as to the method of describing it.

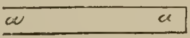


fig. 79.

FIG. 80 IS THE "ASTRAGAL." — Let b = the breadth; draw a line $b\ d$; make c the centre; take half of b, and as radius from c describe the semicircle; draw the horizontal lines $c\ e$.

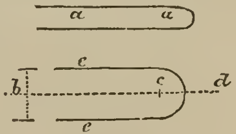


fig. 80.

FIG. 81 IS THE "TORUS." — The method of describing it, the breadth being given, is the same as in last problem.

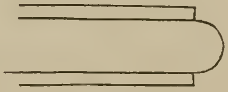


fig. 81.

FIG. 82 IS THE "SCOTIA." — Let $a\ a$ be the top line, and $b\ b$ the bottom one; from a drop a perpendicular to b; divide this into three equal parts; from the first of these, from a, draw any line $e\ d$ parallel to a or b; from the point of intersection c, with radius $c\ a$, describe the semicircle $e\ d$; from d, with $d\ c$, describe part of a circle, meeting the line $b\ b$; draw the fillets $b\ b$, $a\ a$.

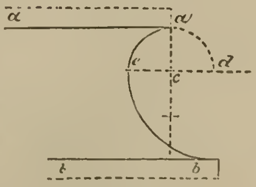


fig. 82.

Method 2nd. — Let *a a*, fig. 83, be the upper line, and *c c* the lower; from *a* drop a perpendicular to *c*; divide *a c* into seven equal parts; through the third of these, from *a*, draw a line parallel to *a a*; from *b*, with *b a*, draw the semicircle *b d*; from *d* draw to *e*, perpendicular to *b d*; produce *a a* to *e*; from *e* draw through *b* a line meeting the semicircle *b d* produced in *m*; from *e*, as a centre, with *e m* as radius, describe part of a circle to *n*.

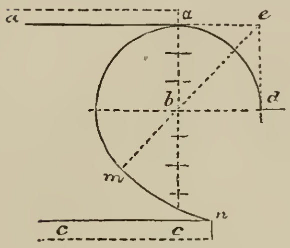


fig. 83.

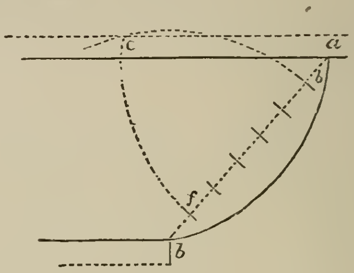


fig. 84.

FIG. 84 IS THE "ECHINUS," "QUARTER ROUND," or "OVOLO." — Let *a b* be the two points; join them by a line *a b*; divide this into seven equal parts; from *b*, with *b* 6, and from *a* with same radius, describe arcs, cutting in *c*; from *c*, with *c a*, describe the arc *a b*.

Method 2nd. — Let *a b*, *c d*, fig. 85, be the two lines; draw *b d* perpendicular to *c d*; divide it into three equal parts; produce *c d* to *e*, and make *d e* equal two of the parts on *b d*; from *e* draw to *f*; join *d f*; from *d f*, with any radius greater than half, describe arcs cutting in *g*; from *g*, with *g f*, describe the arc *f d*.

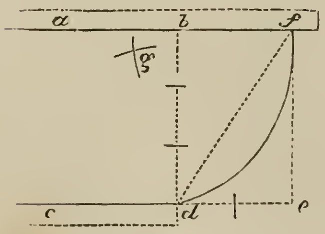


fig. 85.

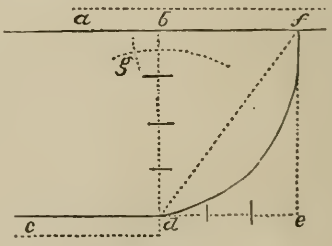


fig. 86.

Method 3rd. — Let *a b*, *c d*, fig. 86, be the lines; divide *b d* into four equal parts; make *d e* equal three of these; draw *e f*, and proceed as in last problem.

FIG. 87 IS THE "CAVETTO," OR "HOLLOW." TO DESCRIBE IT. — Let *a b*, *c d*, fig. 88, be the lines at top and bottom; from *b* draw to *d* perpendicular to *a b*; divide *b d* into three equal parts; from *d* lay on *d c* to *e* equal to two of these; join *b e*; from *e* and *b*, with radius greater than half *e b*, draw arcs cutting in *f*; from *f*, with *f b*, draw the arc *b e*.

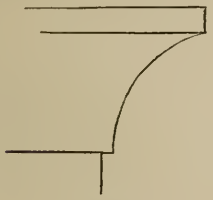


fig. 87.

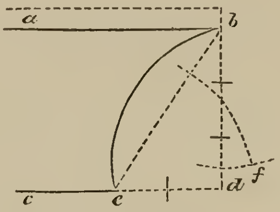


fig. 88.

Method 2nd. — Let *a b*, *c d*, fig. 89, be the two lines; divide the perpendicular into five equal parts; make *d e* equal to four of these, and proceed as in last problem.

FIG. 90 IS THE "APOPHYGEE" GENERALLY USED TO CONNECT A SHAFT OF A COLUMN WITH ITS BASE. TO DESCRIBE IT. — Let *a b*, fig. 91, be the line of base, and *c* that of the shaft; produce *c* to *d*; divide *a d* into four equal parts; lay five of these from *d* to *e*; join *e d*; bisect it by arcs cutting in *f*; from *f*, with *f a*, describe the arc *a e*.

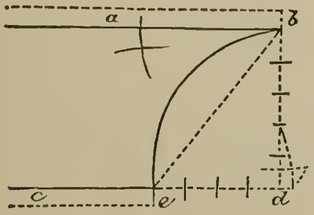


fig. 89.

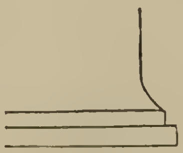


fig. 90.

FIG. 92 IS THE "CYMA-RECTA." TO DESCRIBE IT. — Let *a b*, *c d*, be the lines; join *a d*; divide it into five equal parts; bisect the

part *a e* (the point *e* is the third from *d*) by arcs cutting in *f*, and the part *d e*, by arcs in *g*. From *f*, with *f a*, describe the arc *a e*, and from *g*, with *g d*, an arc *e d*; the moulding is complete.

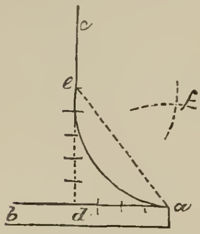


fig. 91.

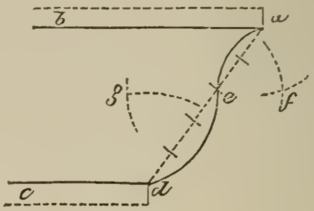


fig. 92.

Method 2nd. — Let *a b*, *c d*, fig. 93, be the lines; drop a perpendicular to *e*; produce *c d* to *e*; make *d e* = *e b*; join *d b*; divide it into twelve parts; from *d* and *e*, (the sixth of these,) with radii *d* 5, *e* 1, describe arcs cutting in *f*; from *e* and *b*, with radii *e* 11, *b* 7, arcs cutting in *g*; from *f* and *g* as centres, with radii *f d*, *g b*, describe arcs meeting in the point *e*.

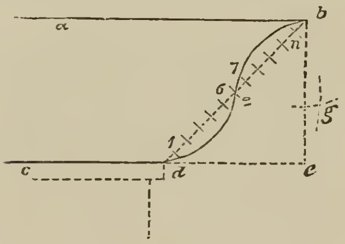


fig. 93.

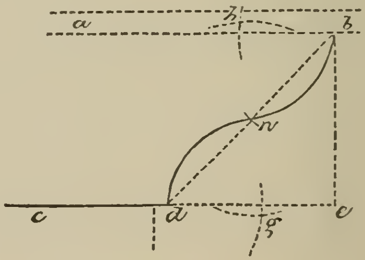


fig. 94.

Fig. 94 is the "cyma-reversa." To construct it. — Let *a b*, *c d*, be the lines; produce *c d* to *e*, and drop a perpendicular from *b*; from *e*, with *e b*, describe an arc cutting *c e* in *d*; join *d b*; bisect it in the point *n*; from *d* and *n*, with radius greater than half *d n*, describe arcs from the point of intersection as centre; describe an arc *d n*; from *n* and *b*, with same radius, describe arcs cutting in *h*; from *h*, with *h b*, describe an arc meeting the arc *d n* in *n*.

Fig. 95 is the "ogee." To construct it. — Let *a b*, *c d* be the lines; join *b d*; divide it into four equal parts; through the third of these from *d*, as *e*, draw a line parallel to *a b*. With the distance *e b*, from *e*, lay on *e f* to *h*; from *h*, with same distance, describe a semicircle to *o*; draw *h o* parallel to *e b*, cutting the semicircle described from *h* in the point *o*; join *o d*; bisect it by arcs meeting in *g*; from *g*, with *g d*, describe the arc *o d*.

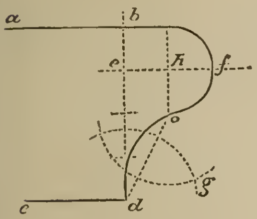


fig. 95.

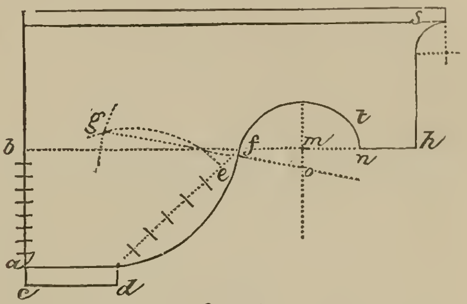


fig. 96.

We now proceed to give examples of various MOULDINGS, with the method of describing them. Draw the line *a b* (fig. 96); divide it into nine equal parts; from *b* draw to *h*, at right angles to *a b*; take any point *f* for the termination of the quarter round, from the end of the fillet *c d*; join *f d*; divide it into seven equal parts; from 1 and 6, with 1, 6, as radius, describe arcs cutting in *g*; from *g*, with same radius, describe the quarter round; from *f*, make *f n* equal to ten of the parts in *a b*; bisect *n f* in *m*; draw a line through *m* parallel to *a b*. From *g*, through the point where the arc 6 *g* intersects *f b*, draw the line *g f o*; make *h n* equal to four and a half parts of *a b*; from *o* as a centre, with *o f* as radius, describe an arc to *t*; from *m*, with radius *m n*, describe another meeting this. This moulding is met with in the Tuscan order.*

TO DESCRIBE THE MOULDING IN FIG. 97.—Draw any two lines cutting in *c*; with *c b* as radius, describe a semicircle, *e a d*; divide *c d* into two equal parts; make *d e* equal to one of these; drop a perpendicular from *e* to *f*; make *f g* equal to *e d*, and *g h* to *d e*;

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* See the section on Orders of Architecture.

from *e* and *h*, with radius greater than half the distance between them, describe arcs cutting in *m*; *m* is the centre of the arc *e h*.

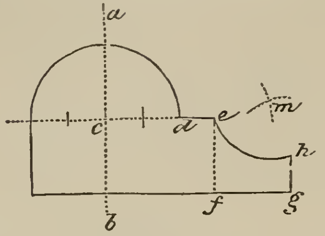


fig. 97.

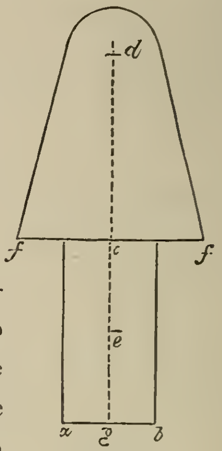


fig. 98.

TO DESCRIBE THE MOULDING IN FIG. 98.—Draw any line *d g*; divide *g d* into two equal parts at *c*; divide *c g* also at *e*; make *c f*, *c f*, equal to *c e*; bisect *c f*, and make *g b*, *g a*, equal to it; from *a* and *b* draw to *f c f*, perpendicular to *a g b*; from *d* describe the semicircle with radius *g b*; join the points *f f* with the extremities of this.

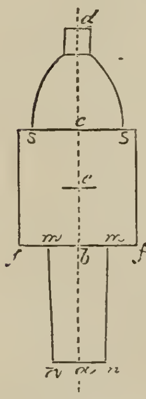


fig. 99.

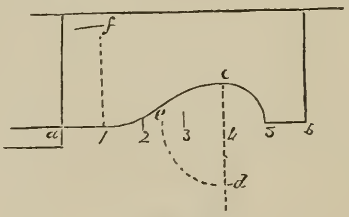


fig. 100.

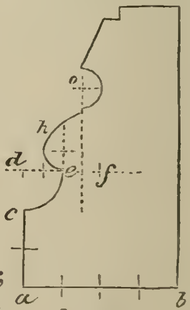


fig. 101.

TO DESCRIBE THE MOULDING IN FIG. 99.—Draw the line *a d*; make *a b* equal to *b c*; bisect *c b* in *e*; draw through *c* and *b* lines *f f*, *s s*, at right angles to *d a*; make *b f*, *s c*, equal to *b c*; bisect *b f*, *b f*, in *m m*; join *m n*, *m n*. The remainder of the moulding will be easily drawn from inspection of the diagram.

TO DESCRIBE THE MOULDING IN FIG. 100.—Draw *a b*, and divide it into six equal parts; through the fourth of these draw a line *c d* at right angles to *a b*; bisect the distance between 2 and 3 in the point *e*; from 4, with 4 *e*, describe the arc *d c*; from the point 1, draw 1 *f* perpendicular to *a b*, and make it equal to *a e*; from *f* as centre, with *f* 1, describe an arc; from *d*, with *d c*, describe a second arc, and from the point 4, with 4, 5, the arc *c* 5; the three arcs joining will describe the curve as in the diagram.

To DESCRIBE THE MOULDING IN FIG. 101. — Draw *a b*; divide it into four equal parts; make *a c* equal to two of these, and *c d* equal to one; through *d* draw *d f* parallel to *a b*; from *d*, with *d c*, describe the arc *c e*; make *e f* equal to *e d*; from the centre, above *e*, describe the part of the circle to *h*; from *f*, with *f h*, describe the curve meeting the semicircle described from *o*.

To DESCRIBE THE MOULDING IN FIG. 102. — Draw *d e f*, and the semicircle *a e*, with radius *d e*; divide *d e* into five equal parts; make *e f* equal to one of these; make *d b* equal to twice *d e*; from *f* draw a perpendicular, meeting *c b* produced.

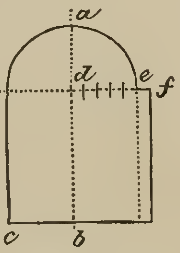


fig. 102.

To DRAW THE MOULDING IN FIG. 103. — Draw *a b*; divide it into five equal parts; make *c d* equal to four of these; through *d* draw *d f* parallel with *a b*; from *d*, with *d c*, draw the arc *c e*; make *e f* equal to *d e*; divide *e f* into five parts; make the line above *f* equal to one of these; draw *f g* equal to six of these; from *g*, with radius *d c*, describe the arc; bisect *g f*, and lay the distance to *h*; it is the centre of the curve, meeting the semicircle described from *m*; join *n o*, *o s*.

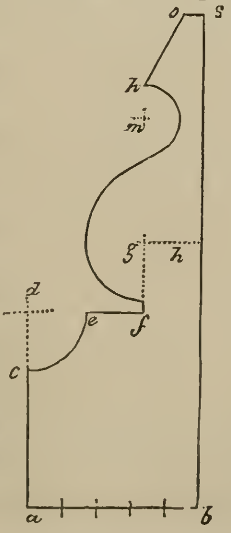


fig. 103.

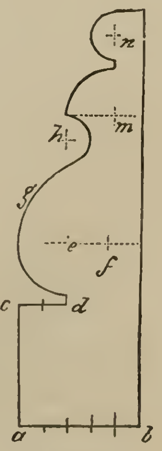


fig. 104.

To describe the moulding in fig. 104. — Divide *a b* into five equal parts; make *a c* equal to *b a*; make *c d* parallel to *a b*, and equal to two parts; from *e*, with *c d*, describe the arc; *f, h, m, n*, are the centres from which the other arcs are described.

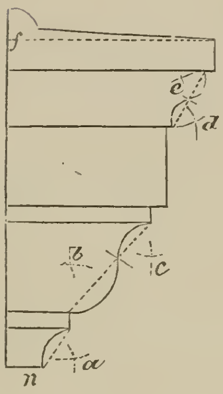


fig. 105.

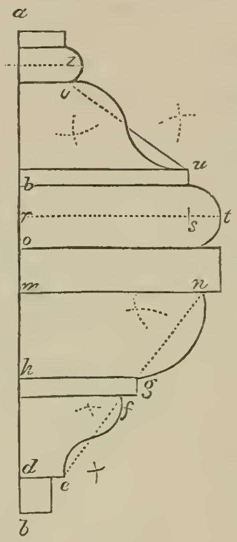


fig. 106.

The mouldings in fig. 105 may be drawn easily by inspecting the figure; *a b, c d, e* and *f* are the centres of the curves; the measurement for the height of fillet must be taken from the base *n*, on the line *n f*.

In drawing the mouldings in fig. 106, the base *b* must first be drawn; then the line *a b* at right angles to it; the respective depths of the mouldings must be laid down on this line, as *d, h, m o*, and *p*; *t, t, 2*, are the centre lines of the torus *s* and 2; *e f* is a "cyma-reversa;" *g n* the quarter round; *u v* the "cyma-recta."

We shall now proceed to give illustrations of the different varieties of Arches, with explanations as to describing the curves geometrically; the first we shall notice is the

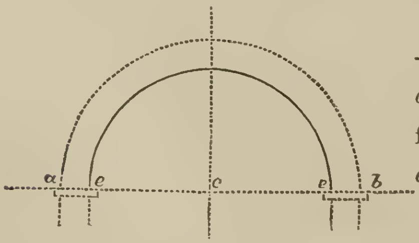


fig. 107.

Semicircular Saxon Arch. — (Fig. 107.) — Draw the line *c*, and perpendicular to it *a b*; from *c* lay off to *e e*, and with *c c* describe the semicircle.

To describe the Norman or Horse-shoe Arch. — (Fig. 108.)

— Draw the line *e b*, and perpendicular to it another, *b a*; from *b* lay off to *d*, and from *d*, with *b e*, describe the arch; draw perpendicular lines, joining the extremities of the arch with the line *e b e*.

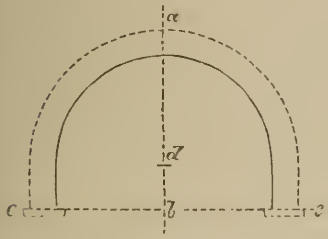


fig. 108.

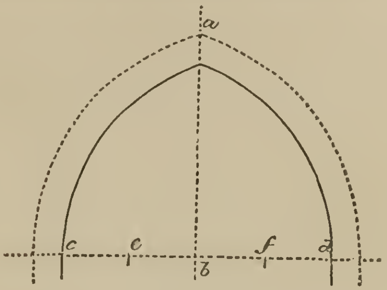


fig. 109.

TO DESCRIBE THE POINTED HORSE-SHOE ARCH. — (Fig. 109.) — Draw the line *c d*, *b a*, perpendicular to one another; divide *c b*, *b d*, each into two equal parts at *e f*; from *e*, with *e d*, describe an arc, and from *b*, with *b c*, another, both meeting in *a*

TO DESCRIBE THE EQUILATERAL ARCH, OR EARLY ENGLISH ARCH. — (Fig. 110.) — Draw *c e*, *m n*, at right angles to each other; make *m e* = *m c*; from *e c*, with radius *e c*, describe arcs meeting in *h*.

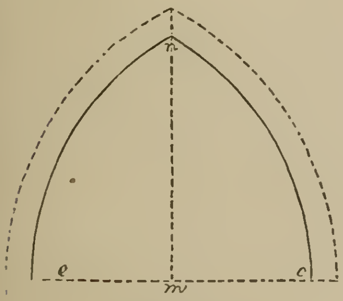


fig. 110.

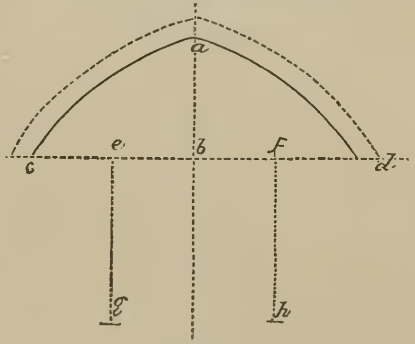


fig. 111.

TO DESCRIBE THE EARLY ENGLISH ARCH GIVEN IN FIG. 111. — Draw the lines *a b*, *c d*, at right angles; divide *c b*, *b d* into two equal parts at *e* and *f*; from these points draw lines to *g h* perpendicular to *c d*, and make *e g*, *f h*, equal to *e f*; from *g* and *h* as centres, with radius *g d*, or *h c*, describe arcs meeting in *a*.

To describe the Lancet Arch, in fig. 112.—Draw *c h*, *f d*, at right angles. Let *a b* be the breadth, and divide it into three equal parts; lay four of these from *a b* to *h*; from *a b*, with *a b*, lay to *d* and *f*; from these, as centres, with radius *d b*, *f a*, describe arcs cutting in *h*; *o o* are centres, from which the dotted arcs are put in.

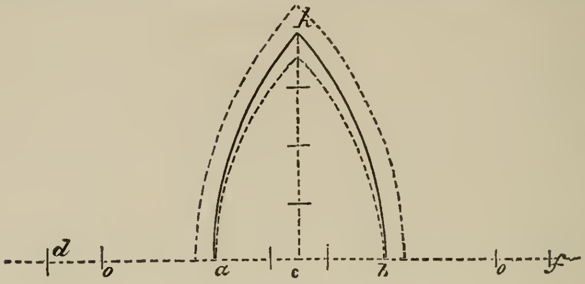


fig. 112.

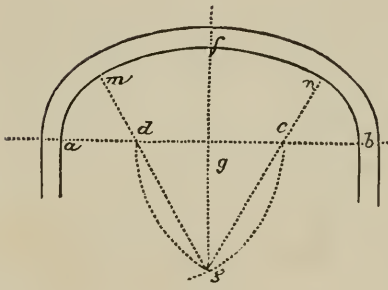


fig. 113.

To describe the "semi-elliptical Arch," in fig. 113.—Let *a b* be the breadth, and *g f* its height; divide *a g*, *g b* into two equal parts at *d* and *c*; from *d c*, with *c d* as radius, describe arcs cutting in *g*; from *c d*, with radius *c b*, describe parts of circles; from *g* draw through *c d* to *m n*; from *g*, with radius *g n*, or *g m*, describe part of circle joining *n m*.

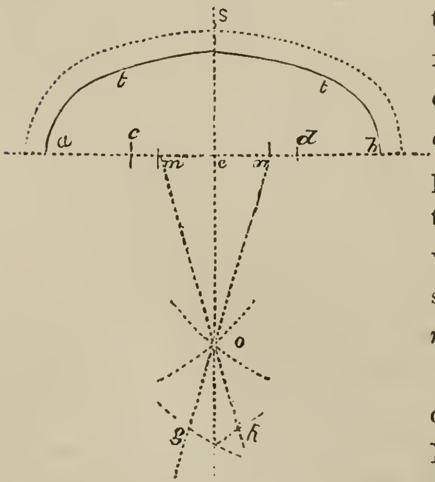


fig. 114.

To describe the Elliptical Arch, in fig. 114.—Draw the line *a b*, divide it in the point *c*, and draw a line perpendicular to *a b*, through this; divide *e a*, *e b*, into two equal parts at *c d*; from *a b*, with radius *a d* or *b c*, describe arcs cutting the line *e* produced; from *d c*, with radius *d b*, describe parts of circles to *t t*; divide *a e*, *e b* into three equal parts, and lay one of these from *e* to *m n*; from *m n*, through *o*, draw lines to *g h*; from *a b*, with *a b*, cut these in *g h*; from the points *g h*, with radius *g t*, describe arcs joining *t t*.

TO DESCRIBE ANOTHER FORM OF ARCH IN THE SAME STYLE.— Draw *c d*, *a b*, fig. 115, at right angles; divide *c b*, *b d* into two equal parts at *g* and *f*; divide *g c*, *f d* into equal parts at *h e*; from *g f*, with radius *g c*, describe arcs or parts of circles to *m n*; from *c d*, with radius *c h*, or *d e*, describe arcs below *c d*; then, with *c d* as radius, from *g* and *f* cut these; from *o o*, with *o m*, *o n*, describe arcs meeting in *a*.

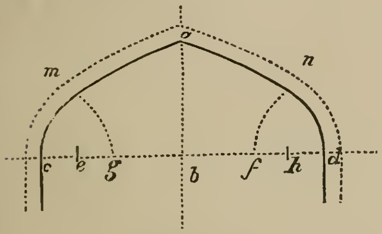


fig. 115.

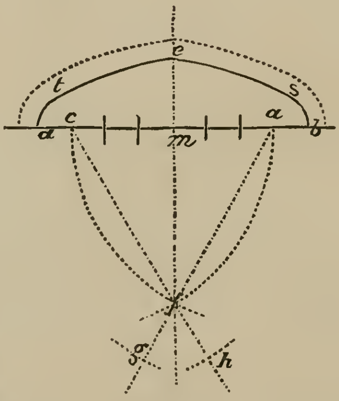


fig. 116.

TO DESCRIBE ANOTHER FORM.— Draw *a b*, *e m*, fig. 116, at right angles; divide *a m*, *b m*, into four equal parts; from *c* and *d*, (the first of these from *a b*,) with radius *a b*, describe parts of circles to *t* and *s*; from *c d*, with *c d*, describe arcs, cutting the perpendicular drawn through *m* in *f*; from *d c*, through *f*, draw lines to *g* and *h*; with *a b*, from *c* and *d*, cut those lines in *g h*; from *g h*, with *g s*, or *g t*, describe arcs cutting in *e*.

We shall now proceed to describe the method of constructing arches used as canopies for niches, &c.

To draw the form in fig. 117.—Make *a b*, *c d*, at right angles; divide *a d*, *d b* into five equal parts; lay one of these from *d* to *e e*; let *c d* be the height of the arch; through *c* draw *f c g* parallel to *a b*; from *e e*, with radius *e b*, describe parts of circles to *m*, *n*; join *a c*, *b c*; bisect *c n*, *c m* (from where the lines *a c*, *b c*, cut the circles described from *e e*) in *o*; draw lines through the points of intersection of the bisecting circle, meeting *c g f* in *f* and *g*; from *f* and *g*, with radius *g n*, describe parts of circles joining *c m*, *c n*.

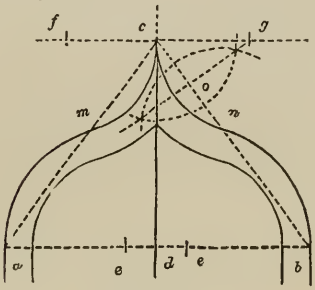


fig. 117.

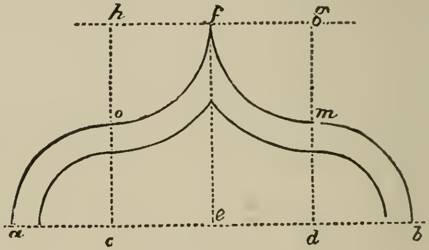


fig. 118.

To describe the form in fig. 118.—Let *a b* be the breadth, and *e f* the height of the canopy arch, equal to half *a b*; draw lines, *a b*, *e f*, at right angles; divide *a e*, *e b* into two equal parts at *c d*; from these points draw lines parallel to *e f*, meeting a line drawn through *f* parallel to *a b*; from *c d*, with *d b*, describe quadrants to *m o*; from *g h*, with same radius, describe other quadrants joining *o f*, *m f*.

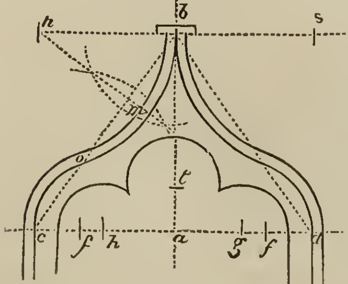


fig. 119.

To describe the form in fig. 119.—Let *c d* be the width, and *a b* the height; draw *a b* perpendicular to *c d*, and join *c b*, *d b* (only one half of the diagram has the constructive lines.) Divide *a d*, *a c*, into two equal parts in *g* and *h*; from *g h*, with radius *g d*, describe arcs cutting *c b* in *o*; bisect *o b* in *m*; draw *h b s* parallel to *c d*, and through the intersection of the bisecting circles between *o b*; draw a line cutting *h b* in *h*; *h* is the centre of the circle, joining *o b*; divide *g d*, *c h*, into three equal parts; from *d c* lay off to *f f*; with *f d* lay from *a* in *a b* to *t*; from *h g* and *t*, with radius *d f*, describe the circles as in the diagram.

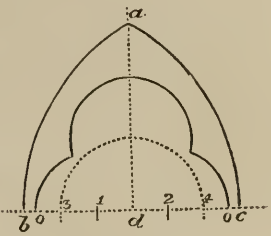


fig. 120.

To DESCRIBE THE EXAMPLE IN FIG. 120. — Let *c b* be the breadth; from *c b*, with *c b* as radius, describe arcs cutting in *a*; join *c a b a*, and draw *a d* at right angles to *c d*; divide *b c*, *b d*, into three equal parts; from *d*, with *d* 3, describe a semicircle, cutting *a b* in *m*, the point 3. Bisect *a c*, *c b*, in the points *c e*; through the points of intersection of the bisecting circles, draw lines cutting the line *c d* in the points *o o*; from the divisions 1, 1, on the line *c d*, and the division 3 on the line *a b*, with radius 1, *o*, describe arcs meeting in *g* and *h*.

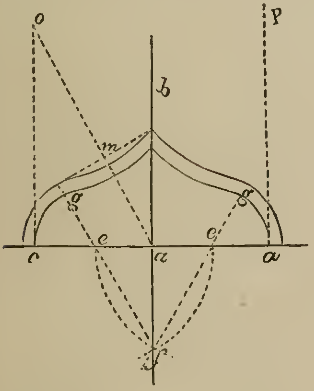


fig. 121.

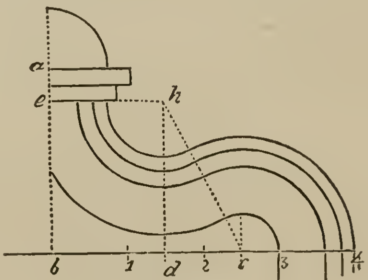


fig. 122.

To DESCRIBE THE ARCH IN FIG. 121. — Draw the lines *a b*, *c d*, at right angles; divide *a d*, *a c*, into two equal parts at *e c*; from *c c*, with radius *e c*, describe arcs cutting *b a* produced in *f*; from *f*, through *c c*, draw lines to *g g*; from *e c*, with *e c*, describe arcs to *g g*; join *g b*; bisect it in the point *m*; from *a*, through *m*, draw a line, meeting a line perpendicular from *c* in *o*; from *o*, with radius *o g*, describe the arc *g b*; *p* is the corresponding centre to *o*.

To describe the Arch in fig. 122. — Draw *a b*, *b c* 4, at right angles; divide *b* 4 into four equal parts; bisect 1, 2, in *d*, and 2, 3, in *c*; from *c*, with *c* 3, describe the arc as in the diagram; make *b e* equal to two of the parts in *b c*; draw *e h* parallel to *b d*; join *d h*; by a line perpendicular to *b c*, form *c h*; *h* is the centre of the arc meeting *a b*, and that described from *c* as a centre.

To describe the Arch in fig. 123. — Let *a b* be the breadth; draw *c h* at right angles to this; divide *a b* into five equal parts; in *c n* draw the line *n m* parallel to *a b*, and at a distance from *a* equal to two of the parts in *a b*; make *n o*, *o m*, equal to four of these; the points 1 and 4, in *a b* and *n m*, are the centres from which the various arcs are described.

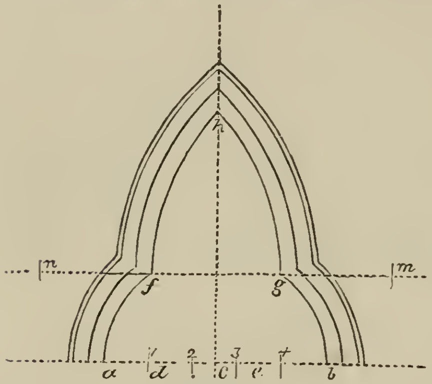


fig. 123.

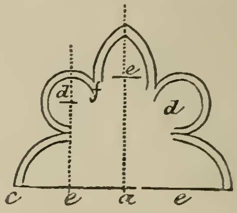


fig. 124.

The Arch in fig. 124 is described from the centres *e d* and *f*.

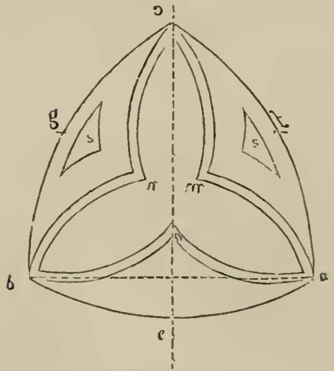


fig. 125.

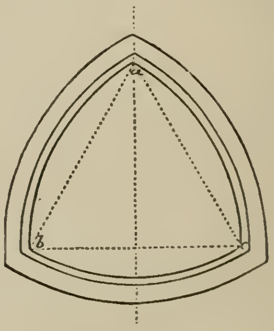


fig. 126.

To describe the Arched Window opening in fig. 125. —

Describe an equilateral triangle *a b c*; *a b c* are the points from which the arcs are described.

IN FIG. 126 THE METHOD IS SHOWN OF DESCRIBING THE INTERNAL TRACERY-WORK. — Draw as before the equilateral triangle and the outline curve; bisect *a c*, *b e*, *a b*, in the points *e*, *f*, *g*; from the point *e*, with radius *a e*, describe arcs to *m*, *n*, from *a* and *b*; from *f* and *g*, with same radius, other arcs, meeting in *o* and *m*, and *n*, from *a*, *b*, and *c*.

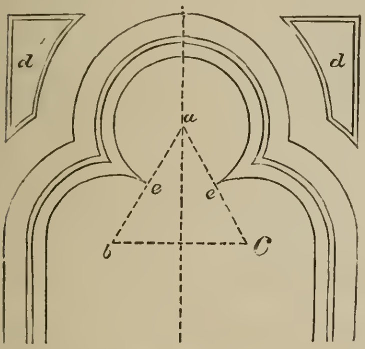


fig. 127.

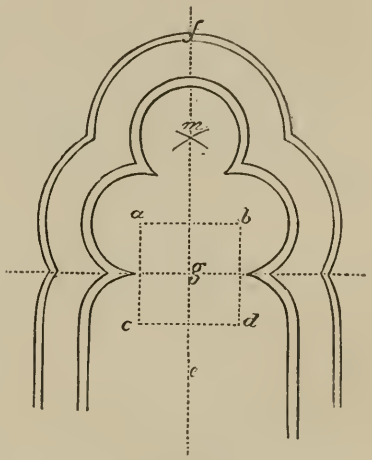


fig. 128.

TO DESCRIBE THE ARCH IN FIG. 127. — Draw a line *b c*; bisect it, and draw perpendicular to it a line from *a*; make the point *a* distant from the line *b c* equal to half *b c*; bisect *a b*, *a c*, in *e e*; with *b e* as radius from *b c* and *a*, describe the arcs as in the diagram, and the curves of the sunk pannels *d d*.

TO DESCRIBE THE ARCH IN FIG. 128. — Draw *e f*, and at right angles to it the line *g*; on *g* make a square *a b c d*; from *a* and *b*, describe, with radius *a b*, arcs meeting in *m*; bisect any side of the square *a b c d*, and with the distance obtained as radius; from *a b*, *c d*, and *m*, as centres, describe the arcs in the diagram.

TO DRAW THE INTERSECTING ARCHES IN FIG. 129. — Draw the line *e f*; let *c d* be the breadth of an arch; divide it in *b*; draw *b h*; make *d a* equal to *d b*, and draw *a g*; *b h*, *a g* are the centre-lines of two of the arches; *d m* is the centre line of the third.

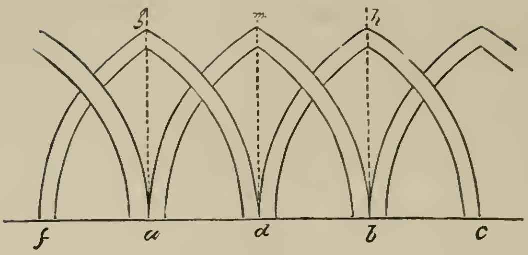


fig. 129.

To draw the intersecting Arches in fig. 130.—*b b* are the centre lines of the two arches; *f f* those of the others; *c c, d d, o o,* are the centres of the respective arches; an inspection of the diagram will sufficiently illustrate the method of drawing them as given.

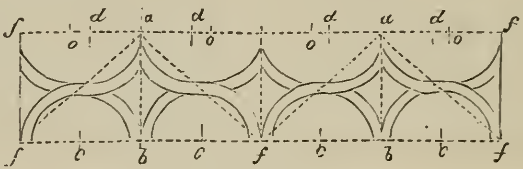


fig. 130.

To draw the Trefoil as in fig. 131.—The equilateral triangle, *a b c*, is first drawn, and the angle *b a c* bisected; a line drawn from *a* to *e*, cutting the line *c f*, gives the centre of the surrounding circles; *a b* and *c* are the centres of the trefoil curves.

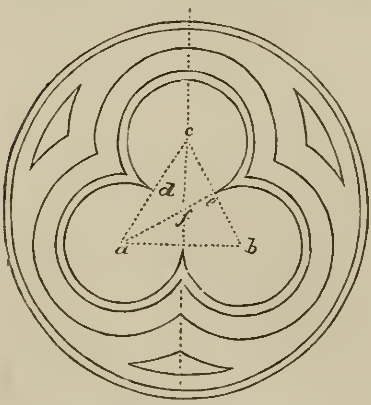


fig. 131.

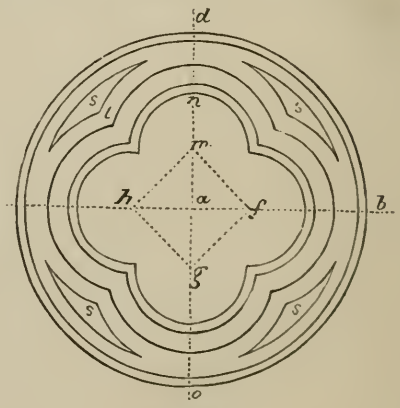


fig. 132.

The Quatrefoil, in fig. 132, is described from the corners, *h m*, *f g*, of a square; *a* is the centre of the surrounding circles, found by the intersection of the diagonals, *a b*, *c d*, of the square; the curves, *s s s s*, are drawn from the centre *a*; while those meeting in *t t t t* are described from the centres, *h m*, *f* and *g*.

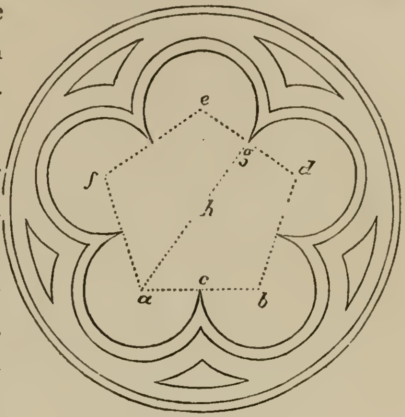


fig 133.

THE "CINQUEFOIL" ORNAMENT, IN FIG. 133, is described from the corners of a pentagon, *a b*, *d e f*; by dividing *e d* equally on the point *g*, and drawing a line from *a* to it, cutting the perpendicular *e c* in *h*, the centre *h* of the surrounding circles is obtained.

THE ORNAMENT IN FIG. 134 is described as follows: Draw *a b*, *o d*, at right angles; divide *a c*, *c b*, into parts at *e f*; parallel to *c*

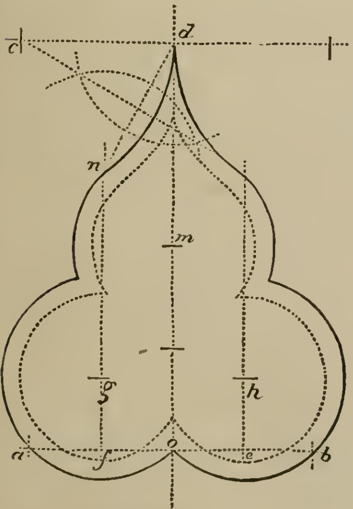


fig. 134.

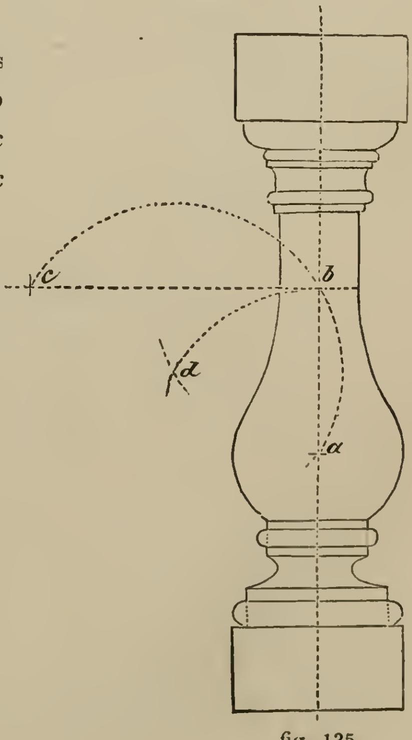


fig. 135.

d, draw lines from *f* and *e*; with *f c* or *c e,* lay from *f* and *e* to *g* and *h*; from these points as centres, with radius *g c* describe parts of circles; divide *o d* into four equal parts; from *m,* the third of these, with radius *g c,* describe arcs meeting the lines produced from *f e* as in *n,* and the circles described from *g* and *h*; join *d n*; through *d,* parallel to *a b,* draw a line to *c*; bisect the line *d n,* and through the intersections of the bisecting arcs, draw a line to *c*; *c* is the centre of the arc joining *d n.*

In fig. 135 we give the DRAWING OF A BALUSTER.—*a* is the centre of the lower curves; the centres of the upper curves are found by drawing a line *c b*; from *a* and *b* describe arcs cutting in *d*; from *d,* with radius *d a,* describe an arc cutting the line *c d* in *c*; *c* is the centre of the curve.

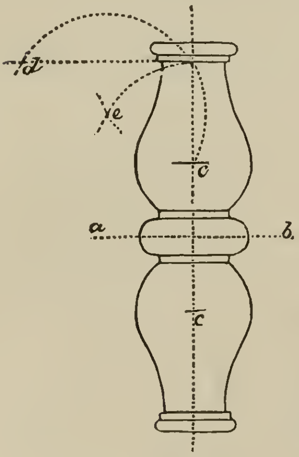


fig. 136.

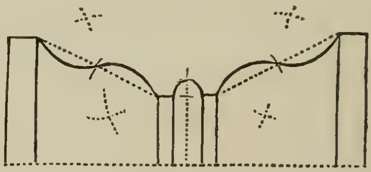


fig. 137.

PART OF THE BALUSTER (the central portion) shown in fig. 136, is drawn in a similar manner, as may be seen on inspection; the centre line is *a b*; the other centres are *c c, e,* and *d.*

THE ORNAMENT IN FIG. 137 will be easily drawn by the assistance of the centres marked.

We now proceed to give examples of VASES, with the mode of describing their contour or outline.

In the example, fig. 138, draw a centre line, *b h*—the base, *a b, c c,* the fillet *d,* and the occult line *f f, g g*; *f f, e c,* are the centres of the circles of the base; join *g h*; bisect it by the line *i i,* cutting *g g* in *k k*; from *k,* with radius *k h,* describe arcs *g h*; on the line *n n* the centres of part of the cap are found. In fig. 139 we give an enlarged view of the top portion of this vase. Draw *a b*; through *e* draw *c e c*; make *d c* equal *d e*; *c c*, *d d*, are the centres for describing the base; *o* and *n* are the centres for the top.

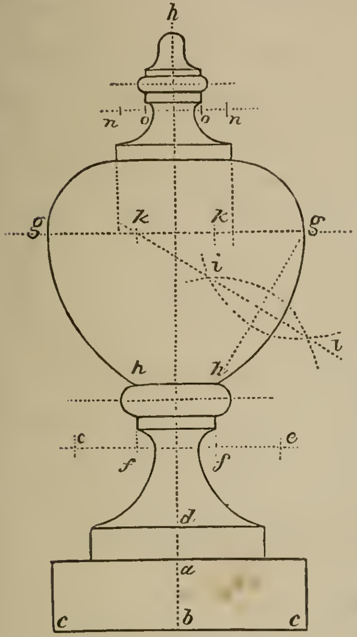


fig. 138.

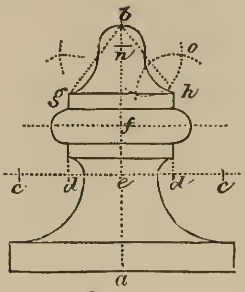


fig. 139.

In the form of vase given in fig. 140, the centres for the base, *a a*, are on the line *c b c*, and at *h h*, on the line *f f*, *i i*, *m m′*, and *n n*. In fig. 141 we give an enlarged view of the upper part of 140. The centres *d e* are found by producing perpendiculars from *o o* to *d* and *e*, cut by lines drawn through the points of intersection of the bisecting circles of the lines *b o*, *c o*; the centre of the top circle at *a* is found by bisecting

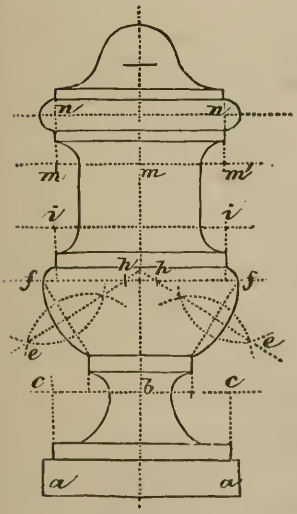


fig 140

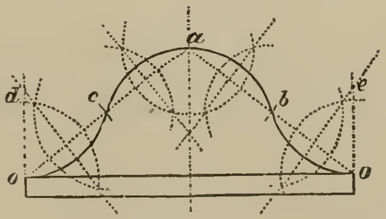


fig. 141.

lines *c a*, *b a*, and producing the lines of bisection, meeting the perpendicular from *a*.

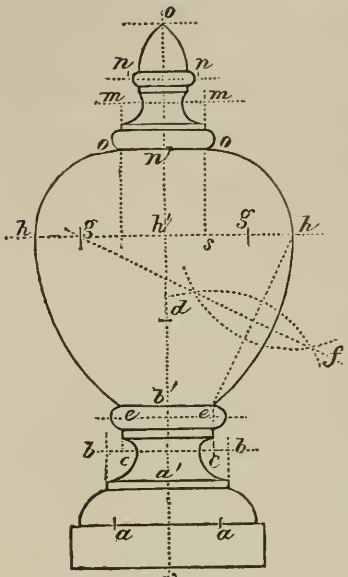


fig. 142.

The form of vase in fig. 142 is described as follows: Make the points *a a* distant from the ends equal to the height of the fillet forming the base; *a a* are the centres of the arcs; *b b*, and *c c*, are the centres of the top part of the base; *e e* are the centres for describing the arcs of the torus; make *b′ d* = to *a a′*, and lay off from *b′ h′* and *n′*; through *h′* draw *h h′ h*; join *e h*; bisect it by a line *f d* produced, meeting *h h* in *g*; *g* is the centre of the arc *h e*; the arcs *h o*, *h o*, are described from the centres *s s*; *m*

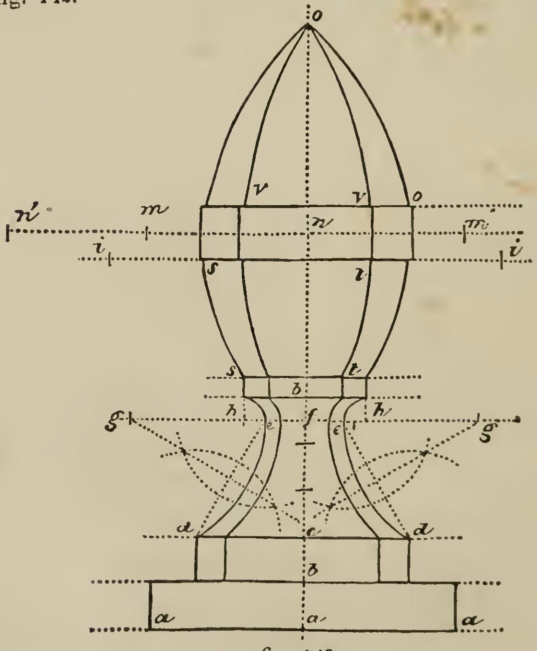


fig. 143

m, *n n*, are the centres for describing the curve of the upper part.

The form of vase in fig. 143 is described as follows: Draw *a o*; form the base *a a*; make *b c* equal *a b*; and from *c* lay off three times *a b* to *b′*; bisect the last part in *f*; through *f* draw *g f g* parallel to *a a*; from *h h* describe the arcs to *e e*; join *d e*, *d e*; bisect them by lines produced, cutting *g f g* in *g g*; these are the centres of the arcs *d e*, *d e*; make *b′ n* equal to *b′ b*, and draw *n m* and *i i*; *m′ m* are the centres from which the arcs *s s* and *o o* are described, *i i* the arcs *t t*, and *n′* the arcs *o v*.

In fig. 144 the upper part of a vase is given; *n n*, *a a*, *b b*, *c c*, and *m*, are the centres from which the curves are described.

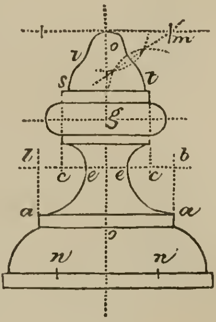


fig. 144.

In fig. 145 the base of a vase is given; *a b* is the centre line, *c c* the centres for the "torus" *c c c*, and *f f* for that at *f e f*; produce *f f* to *h h*, and *c c* to *d d*, meeting the line drawn through *g* parallel to *c c c*; *h h* and *d d* are the centres of the curves.

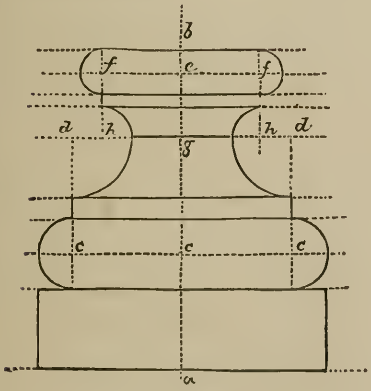


fig. 145.

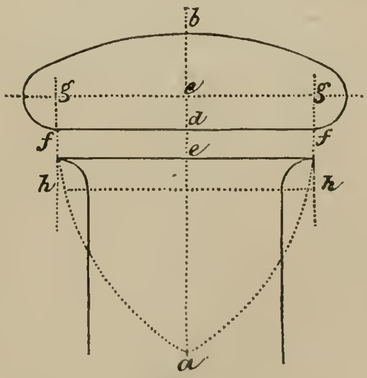


fig. 146.

TO DESCRIBE THE PART OF THE HAND RAIL OF A STAIR SHOWN IN FIG. 146. — Draw *a b*, and at right angles to it, through the points *c d* and *e*; from *c* lay off to *g g*, and from these describe curves to *f* *f* and from *h h* ; from *f f*, with *f f*, describe arcs meeting in *a* ; with *a b*, from *a* describe the part of the circle joining the arcs from *g g*.

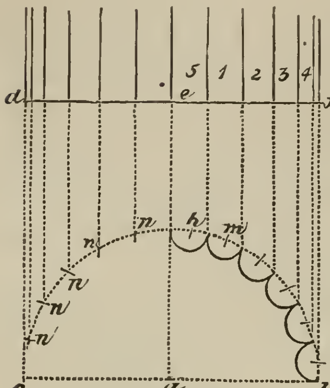


fig. 147.

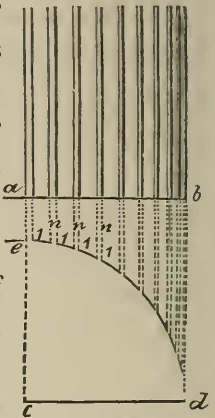


fig. 148.

THE MANNER OF DESCRIBING THE "FLUTES" OR HOLLOWS IN THE SHAFT OF A COLUMN IS SHOWN IN FIG. 147. — Let *b a c*, or *d e f*, be the diameter of the shaft at its base; describe a semicircle *b h c*. Suppose there are to be twenty-four flutes in the shaft; divide *b h c* into twelve (half) equal parts; bisect each of these parts, and from the points as centres describe small semicircles, as in the diagram, or merely mark the points of division, as *h h* ; parallel to *a b*, from the points, draw lines, as *c d*, *b f* ; 1, 2, 3, 4, 5, shows the division between the flutes, lessening in breadth as they approach the outside line; thus giving the appearance of roundness or distance. When the shaft tapers towards the top, the diameter at the upper extremity is taken and divided as above described.

In fig. 148 the method of drawing the hollows in cases where each is divided from the other by a narrow band or fillet is given; *a b* is the semi-diameter of shaft; *c d* the line on which the semicircle is drawn; *n n n* is the breadth of the fillets.

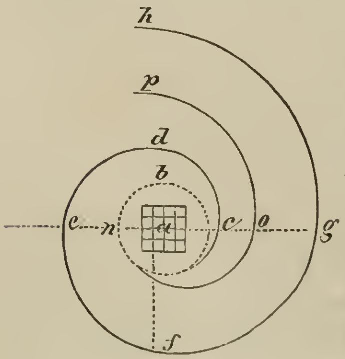


fig. 149.

TO DESCRIBE THE SPIRAL SCROLL OF THE TERMINATION OF A HAND RAIL FOR A STAIR, AS IN FIG. 149. — On the line *a* draw a square, and divide it as in

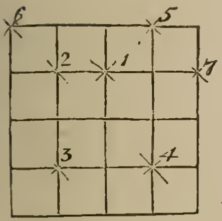


fig. 150.

fig. 150. From *a* describe the circle *n b e*; then, from the point 1 (see fig. 150) describe the curve to *e*; from 2, from *e* to *d*; from the point 3, from *d* to *c*; from 4, from *c* to *f*; from 5, from *f* to *g*; from 6, *g h*. Suppose the breadth of rail to be *h p*; then from the point 6 draw the curve *p o*; from point 7, *o* to *n*.

THE FIVE ORDERS.

THEIR PROPORTIONS AND METHODS OF DELINEATION.

Fig. 151 is an elevation of the Tuscan order, as generally received. The part from *a* to *b* is the pedestal; from *b* to *c* the base; from *c* to *d* the shaft; from *d* to *e* the capital; from *e* to *f* the entablature — the parts, base, shaft, capital, and entablature, being termed a column. The heights of the mouldings and the projections are all taken from the standard of measurement of each column; this standard is the diameter of shaft immediately above the base. This is divided into two equal parts, termed modules; each of these again into thirty equal parts. The diameter is therefore divided into sixty equal parts; if necessary, each part is divided into sixty parts, called seconds. The standard is, therefore, thirty parts equal one module; two modules equal one diameter, or sixty parts. According to Palladio and other authorities, the height of column (Tuscan) now under consideration is, including base and capital, equal to seven diameters. To ob-

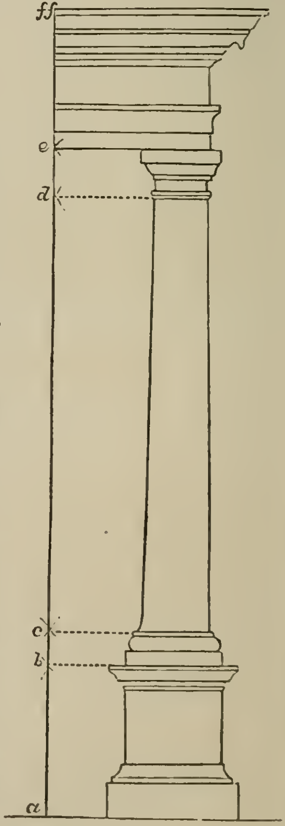


fig. 151.

tain, therefore, the diameter of any column, its height being given, all that is necessary is to divide the height into seven equal parts, one of which is the diameter; or where, on the contrary, the diameter is given, seven times this will give the height of column, including base and capital.

We may now proceed to describe the laying out of the various members of a complete ORDER, showing the proportions of the mouldings, their height, and projections. Although some writers discard the pedestal as an integral portion or a correct feature of any of the orders, we follow the majority of those who adopt it as a distinguishing feature. It is not here our province to enter into a detail of the æsthetic rules guiding the laying out of the various orders; we merely give examples of the parts as generally received. To those of our readers anxious to go into the matter we refer to more technical works.

FIG. 152. Suppose the line *a b* to represent the diameter of a TUSCAN column. Dividing *a b* into two parts in the point *c*, *a c*, *c b* will be the two modules; dividing each module into three equal parts at *d*, *e f*, and *g*, and these again into five equal parts, a scale will be constructed from which to measure the various mouldings. Number as in the drawing.

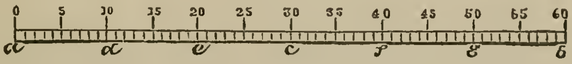


fig. 152.

FIG. 153 shows the method of proportioning the mouldings of the TUSCAN PEDESTAL. Every pedestal is divided into three parts — the BASE, as A B, DIE, B C, and CORNICE, C D. In the figure given, the whole height of the pedestal is four modules. In order to keep our sketches within the limits of the page, we take the proportions from a scale, the divisions of which are only half the size of those in fig. 152. At *a* draw a line of indefinite length, and at right angles to it a line *a b*; make *a b* equal to 2 diameters, or 4 modules; *a c* equal 26 parts; *c d* equal 4 parts; *d e* equal 8 Make the die *e n*

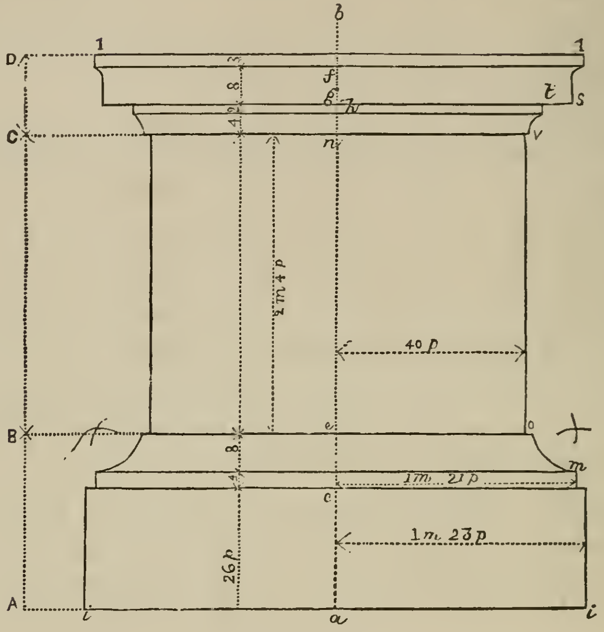


fig. 153.

equal 2 modules, 4 parts; make *b f* equal 3 parts, *f g* equal 8, *g h* equal 2, *g n* equal 4. The projections of the mouldings are all set out from the central line *a b*. From *a*, with 53 parts, lay off to *i*, *i*, and from these draw lines meeting that drawn from *c*; make *d m* equal 51 parts, or set back the line *m d* 2 parts from the end of line *c*; make *e o* equal 41½, and the die equal 40 parts; make *b* 1 1 equal 53 parts; make *g s* equal 50½, and *s t* equal 7, and *n v* equal *e o*.

Fig. 154 shows the BASE of the Tuscan order. Draw the centre line *c d*, put the PLINTH *a b*, making *c b* equal 40 parts, and *c e* equal 15; make the TORUS moulding in height equal 12½ parts. The centre *m* of the circular termination is found in the line *f*. Make the fillet *h* equal 2½ parts, and its projection from centre line equal 33¾, or nearly 34 parts. To describe the APOPHYGEE, by which the lines of shaft are connected with the base, see first part of this work, where also the various forms of mouldings met with in the Orders may be found described, and the methods of delineating them.

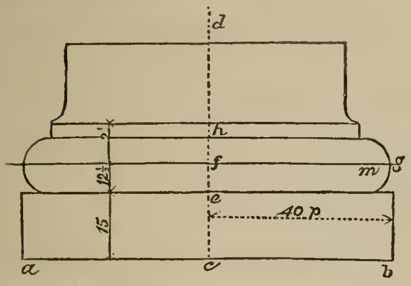


fig. 154.

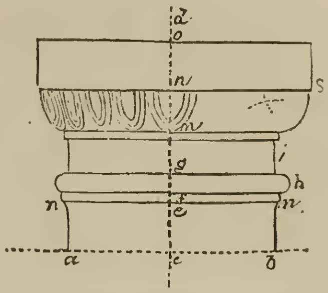


fig. 155.

FIG. 155 is the Tuscan CAPITAL, drawn to the same scale as the others. Draw *c d*, *a b*, at right angles; make *c a*, *c b* equal 22½ parts, or *a b* equal 45; make the fillet of the astragal *e n* equal 24½ parts, or *n n* equal 49 parts. Make *g h* equal 27; *g i*, the NECK, equal *a b*, or 45 parts, and the fillet *m* above the neck equal *e n*. Make the diameter of ABACUS *n' o* equal 60 parts, or 1 diameter. These are the projections; the heights are as follows: The fillet *e f* equal 2 parts; *f g* equal 4; *g m* equal 8½; the fillet above this 1½; the quarter round *m n'* equal 10; the abacus or plinth *n' o* equal 40. The quarter round begins at 1 part back from *s*.

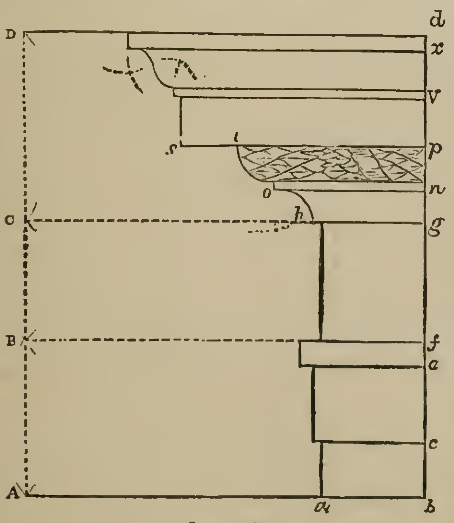


fig. 156.

FIG. 156 is an elevation

of the Tuscan ENTABLATURE. Every entablature consists of three parts — the ARCHITRAVE, A B, the FRIEZE, B C, the CORNICE, C D. Draw the line *b d* representing the centre line of column, and *a b* at right angles to it. The position of the entablature with reference to the column will be seen in fig. 151. In the present figure the position is reversed. Make *b c*, the lowest FASCIA, equal 12½ parts in height and 22½ in width from the central line *b d* to *a*. The upper FASCIA *c e* is 17 parts in height and 24 in width ; the FILLET *e f* is 5 parts in height and 27½ in projection ; the height of the FRIEZE *f g* is 20 parts, and its projection 22½ ; the first moulding in the cornice *g n*, the cavetto, equal 7½ in height, and projection *g h* equal 24. Make the fillet equal 1½, and its projection *n o* equal 32 ; make the quarter round from *n* to *p* equal 9, and its projection *p s* equal 52¼ ; make *p t* equal 40, and join *o t* ; make the

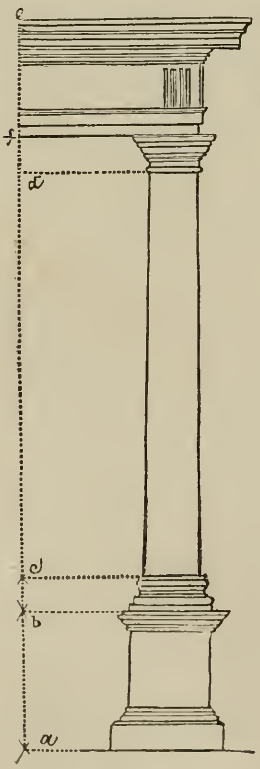


fig. 157.

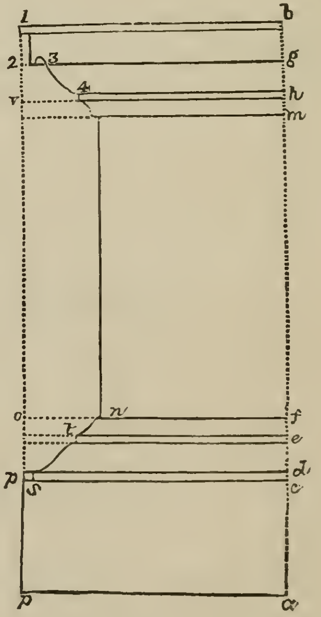


fig. 158.

corona *p v* equal 10 in height, and the fillet above it equal 2; its projection equal 54¼. Put in the cyma-recta to *x*, equal 10 parts, the last fillet equal 3½, and its projection equal 66.

Fig. 157 shows the elevation of the Doric column, with pedestal *a b*, *b c* the base, *c d* the shaft, *d f* the capital, and *f e* the entablature. The height of the column, including base and capital, is equal to seven diameters.

Fig. 158 is the elevation of half of the pedestal of the Doric column to same scale as the last example. Draw *a p*, *a b* at right angles; make *a b* equal to 4 modules 5 minutes, or 4 modules 20 minutes. Make the plinth *a c* equal 26 parts in height; the fillet *c d* equal 1½; the cyma-recta *d e* equal 6½; the fillet *e* equal 1; the cavetto *f* equal 4. Proceed now to put in the cornice; make the top fillet at *b* equal 2 parts; the corona below equal 6½; the quarter round equal 6½; the fillet equal 1, and the cavetto equal 4. Put in the breadth of the die by measuring from *f* to *n*, equal 40 parts. From *n*, the face of the die, measure off to *o*, equal 16 parts; through *o* draw a line to *p* parallel to *a b*. From *p′* set off to *s*, equal 2 parts; from the line *p o* to *t*, equal 11 parts. Make the projection of the cavetto at top of base and at cornice equal to 1 part from line of die. From *v* lay back to 4 equal 12 parts; from 2 to 3 equal 5½. Put in the cyma at *s t*, and the quarter round from 4 to 3.

Fig. 159 represents the base of the column now under consideration; it is sometimes termed the Attic base. 10 parts are given to the plinth; 7 to the torus; 1½ to the fillet; 4 to the scotia; 1 to the fillet above it; 5½ to the second torus, and 1 to the fillet above. The projections are set off from the centre line *a b*, and are as follows, commencing with the plinth, equal 40; torus,

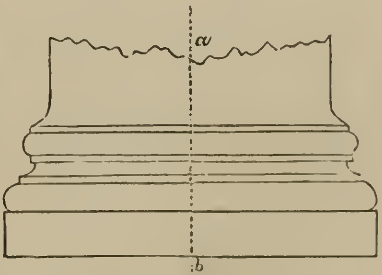


fig. 159.

equal 40; fillet, equal 36⅔; fillet beneath the second torus, 35; second torus, 36⅔; last fillet 34.

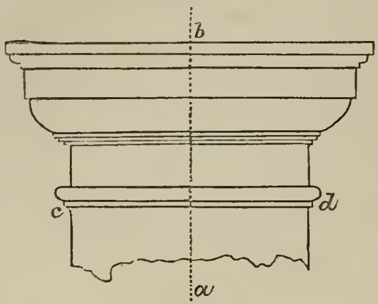


fig. 160.

Fig. 160 is the capital of the Doric order. The various heights and projections are as follows, beginning with the fillet *c d*: The diameter of top of shaft is 52, or 26 parts on each side of the centre line *a b*; fillet *c d* is 1½ parts in height, and projection 28; the astragal or bead, 3½, projection 30; the neck 9 parts, projection 26. The three fillets below the quarter round are together 3⅓ parts in height; this is divided into three equal parts, as in the drawing. The quarter round is 6½ in height; the abacus 6¾, and its projection 36; the quarter round below it begins at a point 1 part back from end of abacus; the last fillet is 39.

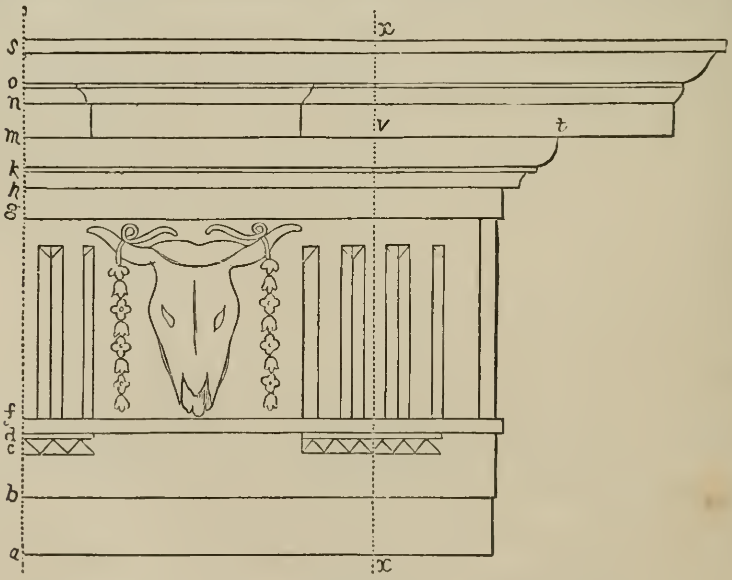


fig. 161.

Fig. 161 shows an elevation of the Doric entablature. The line *x x* is the centre line of column, (see fig. 157,) from which the projections are taken. The architrave *a f* is composed of two fasciæ, *a b*, *b d*, with a fillet *d f*. The guttæ or drops in the upper fascia *b d* are $3\frac{2}{3}$ parts in height, surmounted with a fillet $1\frac{1}{3}$. The triglyph is over this in centre of column, and its width is 30 parts; the distance between the triglyphs is exactly a square, the side of which is the depth of the frieze *f g*; the distances between the triglyphs are called METOPES, and are filled in with the ornament as in the drawing. The following are the heights of the various mouldings, with their projections; *a b* 11 parts, projection equal 26; *b c* equal $9\frac{1}{2}$; *c d* equal $3\frac{2}{3}$; *d e* $1\frac{1}{3}$; the projection of *b* and *d* equal 27; of the fillet *f d* equal 28, its height being 4 parts; the height of frieze *f g* equal 45; *g h* equal 5; projection of *g h* equal 27. Height of *h k* equal 5; the fillet 1; projection of *h* equal 32; of *k* $35\frac{1}{2}$; height of *k m* equal 6; projection of *m* equal $64\frac{1}{2}$; of *v t* equal $39\frac{1}{2}$. Height of *m n* equal 8; *n o* $3\frac{1}{4}$; the fillet $\frac{3}{4}$; its projection 68. Height of *o s* equal $6\frac{3}{4}$; fillet equal $2\frac{1}{4}$; projection 76. The method of drawing the triglyphs and guttæ of this order is further elucidated by

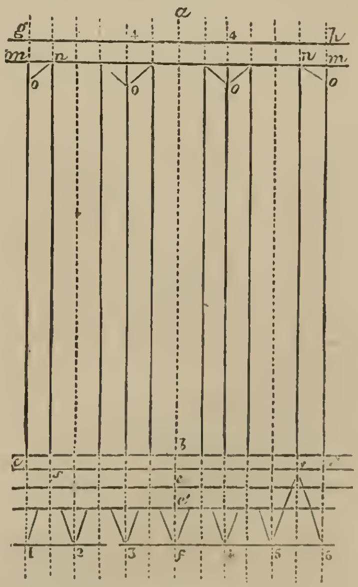


fig. 162.

FIG. 162. Let *a b* be the height of frieze, and *c d* semi-diameter of column at base. Make *b e* equal 4 parts; the fillet beneath, the fillet *e e′* beneath this equal 2; and from *e′* to *f* equal 4. Divide *c b*, *b d* each into six equal parts; and parallel to *a b*, draw through these lines, as in the drawing, to the line *g h*. On *g c*, lay off equal $2\frac{1}{2}$ parts to *m*, *m*; and with *m n*, from *m*, lay off to *o*; join *n o*, *n o*. On the

fourth line, from points *g* and *h* draw to *o*, *o*, and put in the angular lines. Bisect the fillet *b e* in the line *s s*; from the points 1, 2, 3, &c., at *f*, draw lines to *s s*, where this line intersects the vertical ones, dotted as in the sketch. These angular lines are only continued to the under side of fillet *e′*.

FIG. 163 represents the elevation of the IONIC order. A is the base of pedestal; B the die; C the cornice; D the base of column; E the shaft; F the capital; G the architrave; H the frieze; I the cornice of entablature.

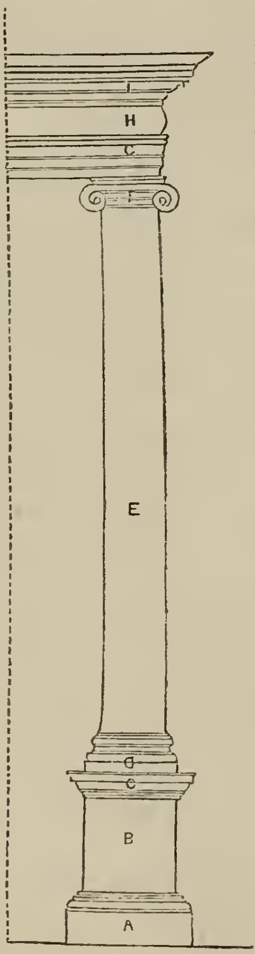


fig. 163.

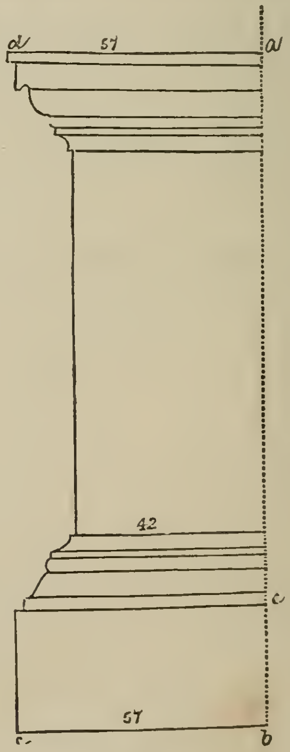


fig. 164.

FIG. 164 shows the elevation of half of Ionic pedestal, the line *a b* being that from which the projections are taken; the plinth *b c* is

28½ parts in height, and 57 in projection. The upper fillet *a d* is 2 parts high, and 57 in projection. The width of die is 42 parts. The whole height of pedestal from *a* to *b* is 2 diameters 34 parts, or 4 modules 4 parts. The heights of the other mouldings and projections are as follows, commencing with the fillet at *e* above the plinth, which is in height 1½ parts, projection 54½; the cyma 6½ in height, projection 48½; the astragal 2½ in height, projection 50; the fillet 1, projection 48½; the cavetto 3½, projection 43. The height of die 87 parts; the height of cavetto above die 4 parts, projection 43; the fillet 1, projection 46; the astragal 3½, projection 48; the quarter round 6; the corona 6, projection 55.

Fig. 165 is the Ionic base, the line *a b* being the centre line. The heights and projections are as follows: the plinth *c d*, 10 height, 42 projection; the torus, 8 height, 42 projection; fillet, 1 height, 37 projection; scotia, height 5; second fillet, height 1, projection 34½; second torus, height 5, projection 37; astragal, height 2, projection 34½; third fillet, height 1½, projection 33.

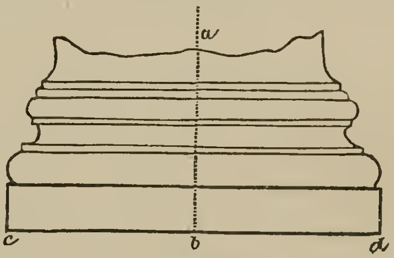


fig. 165.

Fig. 166 shows the elevation of Ionic capital drawn to same scale as the others. The plan of the capital is shown in Fig. 167, and the side view in

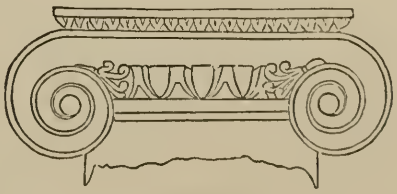


fig. 166.

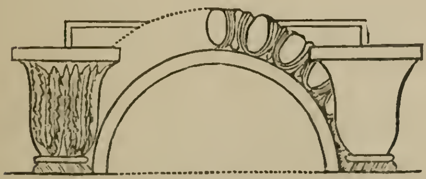


fig. 167.

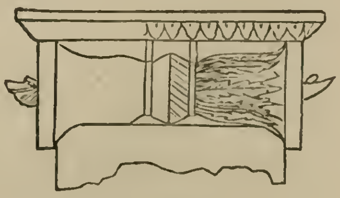


fig. 168.

Fig. 168. The method of describing the scroll termed the VOLUTE is explained in

Fig. 169. Draw *a b, c d* at right angles; let *e f* be the diameter of the eye of the volute corresponding to the breadth of the astragal (see fig. 166;) with half *e f* from the point where *a b, c d* intersect, describe a circle; within this inscribe a square. In fig. 170 the centre of the volute is drawn to a larger scale to enable the pupil to mark out the centres used to describe the scroll in fig. 169. From *e*, fig. 170, with radius *e d*, describe the circle, and within it

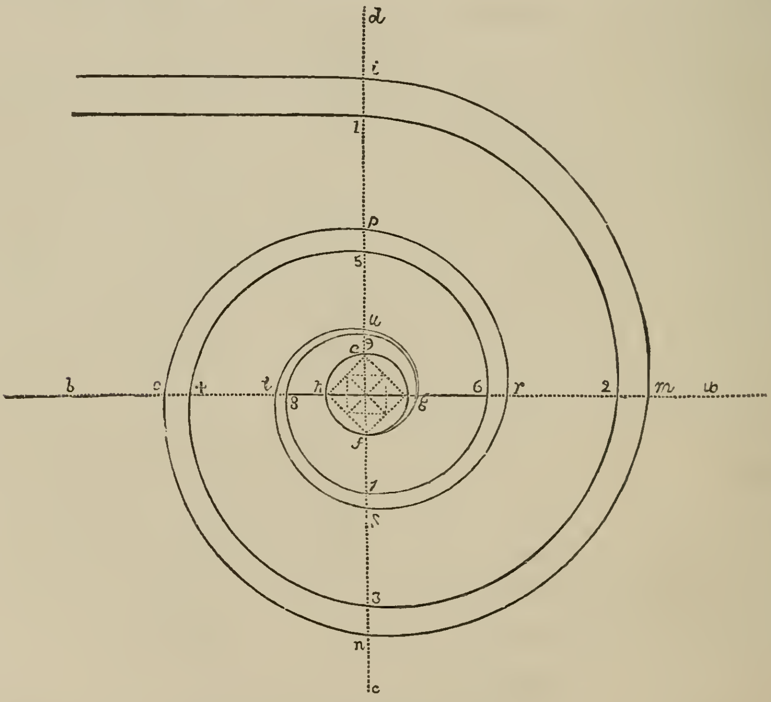


fig. 169.

inscribe the square *a b d c* corresponding to the square *e g f h* in fig. 169. Through *e*, the centre, parallel to *c a* draw *f h*, and parallel to *a b, i g*; join the extremities, and form a square *i h g f*. Divide the diagonals *i g, f h* each into six equal parts at the points

1, 2, 3, 4, 5, 6. At these points draw lines at right angles, forming squares of which the corners are only given in the diagram to avoid confusion. Divide *i k* into four equal parts; from *h* lay one of these to *m*; from *i* to *n*; from *f* to *o*; from *g* to *p*; from 8 to *s*; from 1 to *t*; from 5 to *v*; from 4 to *x*; from 7 to *y*; and so on

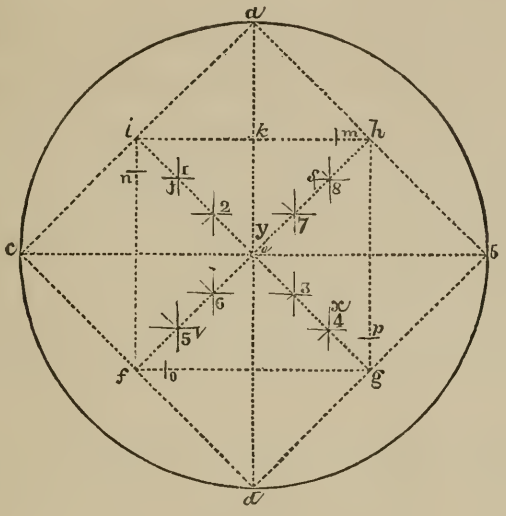


fig. 170

to the point of the square corner at 3. These various points thus obtained are the centres from which the curve is described. Suppose the point *i*, fig. 169, to be the under line of abacus of capital, (see fig. 166,) from the centre, on line *e h*, fig. 169, corresponding to the point *c*, fig. 170, with radius *h i*, describe an arc of a circle to the point *m*, meeting the diameter of *g h* prolonged to *a*. From the point in the smallest square in fig. 169, corresponding to the point *d a*, fig. 170, with radius *h m* describe an arc *m n*, meeting the diameter *c f* prolonged to *c*. From the point on the small square, fig. 169, corresponding to *g*, fig. 170, as a centre, with *g n* as radius, describe an arc *n o*, meeting *g h* produced to *b*. From *f* as centre, with *f o* describe an arc to *p*, meeting line *c d*. From centre 1 (see fig. 170,) with radius 1 *p*, describe an arc to *r*. From centre 8, (see fig. 170,) with 8 *r* as radius, draw an arc to *s*. From centre, 4 (see fig. 170,) with 4 *s* describe an arc to *t*; from centre 5, with radius 5 *t*, describe an arc to *w*; from centre 2, (see fig. 170,) with radius 2 *w*, describe an arc to *g*, and so on. To draw the interior curve proceed as follows: from the point *n m*, (see line *i h*, fig. 170,) with radius *n* 1, describe an arc to the point 2 in the line *a b*, fig. 169; from the point *m*, with the radius *m* 2, an arc to the point 3 on the line *c d*, fig. 169; from the point *p*, with the radius *p* 3, an arc to 4; from the point *o*, with radius *o* 4, an arc 5; and so on from the centres corresponding to the points *s*, *t*, *v*, *x*, *y*, &c., describing curves to the points 5, 6, 7, 8, 9, &c., fig. 169.

Fig. 171 represents the Ionic entablature, *a b* being the centre line of column, and that from which the projections of the various members are taken. In succession, beginning from the point *b* upwards, the heights and projections of the various mouldings are as follows:

1st	height	equal	6½	parts,	projection	equal	26½
2d	“	“	2	“	“	“	27
3d	“	“	8	“	“	“	27½
4th	“	“	2½	“	“	“	29
5th	“	“	10	“	“	“	29½
6th	“	“	5	“	“	“	33
7th	“	“	3	“	“	“	35
8th	“	“	27	“	“	“	33
9th	“	“	5	“	“	“	27
10th	“	“	1	“	“	“	32
11th	“	“	6	“	“	“	36
12th	“	“	2	“	“	“	37
13th	“	“	7	“	proj. to *e* equal 38, to *c*	equal	52
14th	“	“	3	“	“	“	55
15th	“	“	4	“	“	“	60
16th	“	“	4	“	“	“	63½
17th	“	“	1	“	“	“	64
18th	“	“	7	“	“	“	64
19th	“	“	2	“	“	“	72

FIG. 172 represents an outline sketch of the CORINTHIAN COLUMN, with pedestal complete. The height of column is 9½ diameters, including base and capital. A is the base of pedestal; B the die; C the cornice; D the base of column; E the shaft; F, the capital; G the architrave; H, the frieze; I, the cornice.

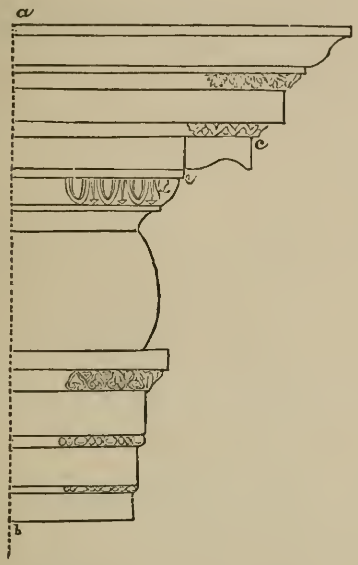


fig. 171.

FIG. 173 is the pedestal of the Corinthian order. The proportions are as follows, taking them in their order from *b c*: the plinth *b c*, 23½ parts in height, its projection from the central *b d* to *a* 57 parts; the torus, height 4, projection 56; fillet ¾, projection 55; cyma 5, projection 47; fillet 1, projection 47; cyma 3½, projection 42; die 3 modules 4½ parts; the cavetto in cornice 3¾, projection 43; fillet ¾, projection 46; quarter round 4¾, projection 50; corona 4½, projection 53; cyma 3½, projection 57; the top fillet 2½, projection 57.

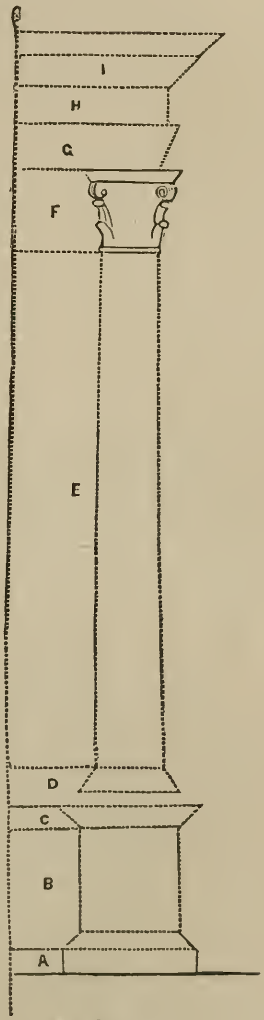


fig. 172.

Fig. 174 represents the base of the order, of which *a b* is the centre line. The heights in the progression of their order, commencing with *b c*, are as follows: 10, 7, 2, 1, 4, $\frac{1}{2}$, 2, 6, $2\frac{1}{2}$, 2. The projections, beginning with *b d*, are as follows: 42, 42, 38, 37. 32, 37, 35, 32.

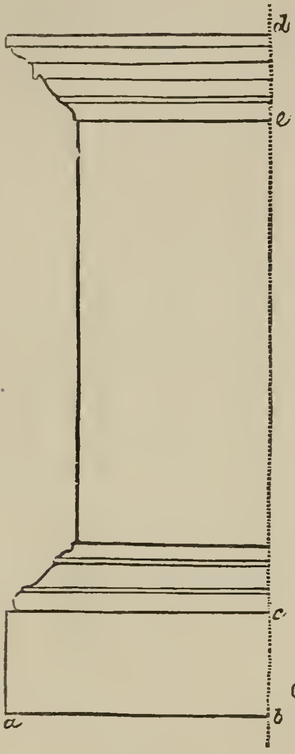


fig. 173.

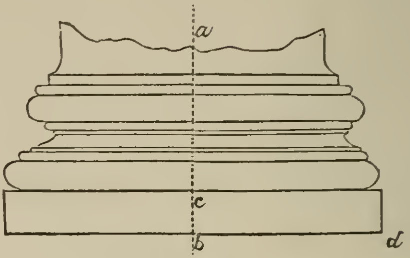


fig. 174.

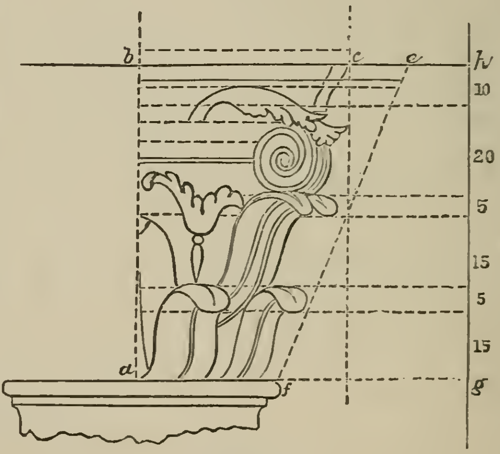


fig. 175.

Fig. 175 represents the capital of the order. The diameter of shaft at the neck is $52\frac{1}{2}$ parts; the fillet $1\frac{1}{2}$, its projection 56; the astragal 4, projection 60. The height from *a* to *b* is 70 parts; the projection from *b* to *c* 46; the projection from *b* to *e* 60. Join *e f*, prolong *a f*, *b c* to *g* and *h*; join *g h* by a line parallel to *b a*, and mark off on it from *g*, as in the sketch. From the points obtained draw lines parallel to *b c*; the intersection of these with *e f* will give the position of the acanthus leaves. The method of laying out the plan of this capital is shown in fig. 176, where *a b* is the diameter of shaft at neck, *c e* corresponding to the distance *b c*, fig. 175. The centre of the circle, of which *d d* is a part, is found by the intersection of the lines at *f*.

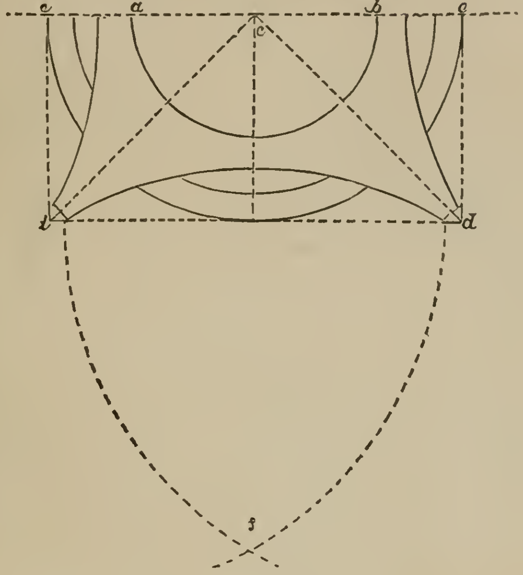


fig 176.

Fig. 177 shows a form of capital of this order filled in.

Fig. 178 is the Corinthian entablature. The heights of the different mouldings, commencing with *a b*, are as follows: 6, 1¾, 8¼, 10½, 5, 2½, 28½, 4½, 1, 5½, 1, 4½, 1, 7½, 2½, 1, 7½, ⅔, 3, ⅔, 6, 2¼. The projections, beginning with *a c*, are as follows: 26, 26½, 27, 27½, 28, 29½, 34½, 26, 26½, 32, 34, 35, 40, 58½, 60, 62, 62½, 66, 74.

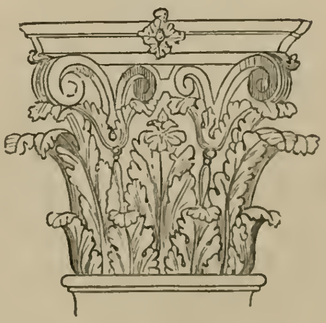


fig. 177.

Fig. 179 represents the outline of the Composite order with pedestal complete; the letters and parts correspond with those given in fig. 172, where the pedestal is delineated. Its height, including base and capital, is 10 diameters.

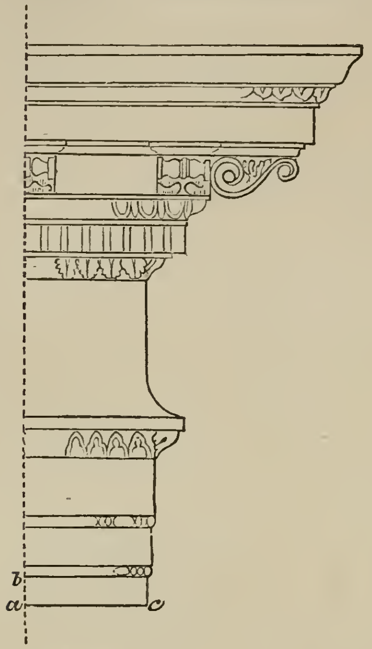


fig. 178.

Fig. 180. The pedestal. The heights, commencing with *b c*, are as follows: 33, 4½, 1, 3, 1½; height of die *d e* 4 modules 5 parts. The height of mouldings in cornice, beginning at *e*, are as follows: 1½, 3, 8½, 1, 5½, 3½, 2½. The projections, beginning with *a b*, are 57, 57, 55, 46, 45, 42, 44½, 47, 52½, 53; top fillet 57.

Fig. 181 represents the base of the order. Heights, beginning with *b c*, 10, 7, ½, 2½, ½, 2, 2, ½, 2, ½, 4½, 2, 1; projections, beginning with *b d*, 42, 42, 38, 36, 37, 37, 36, 36, 37, 36, 34.

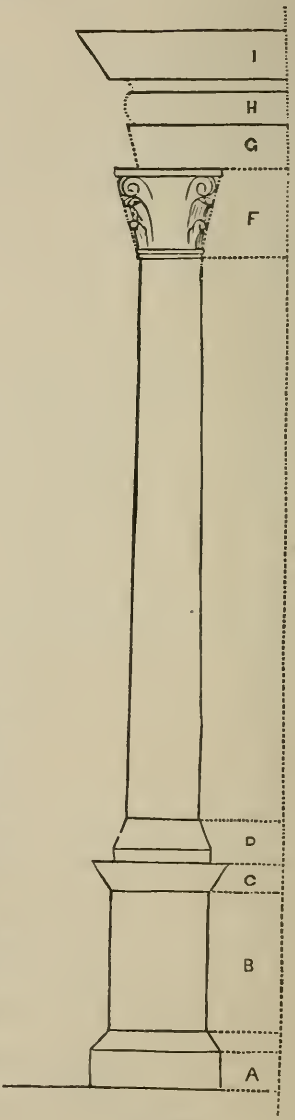


fig. 179.

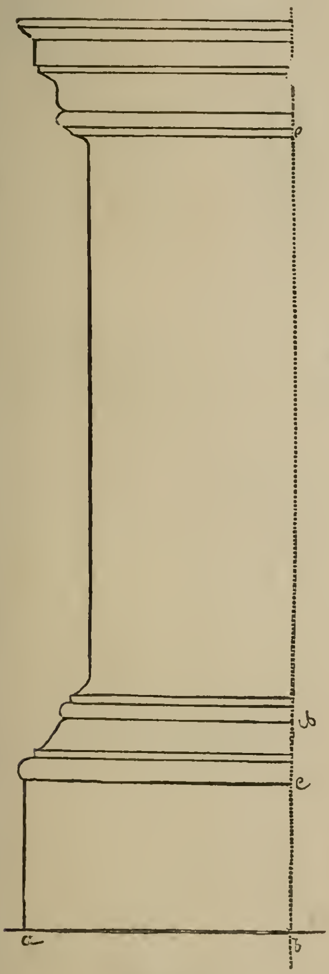


fig. 180.

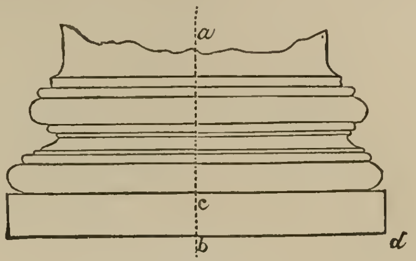


fig. 181.

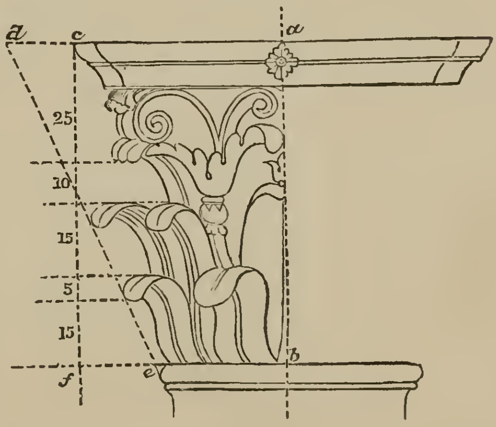


fig. 182.

Fig. 182 represents the capital of the order. The semi-diameter of shaft at neck is 26 parts; the fillet ½ in height and 27 in projection; the astragal 4 in height and 29 in projection. The height from *b* to *a* is 70, projection from *a* to *c* 45, and to *d* 60; the heights on the line *f c* are used by the intersection of the line *d c* to find the height of the ornament. Another form, with the ornaments filled up complete, is given in

Fig. 183.

Fig. 184 is the Composite entablature. The heights of the mouldings, beginning with *b c*, are as follows: 12, 2½, 15, 1½, 3½, 4,

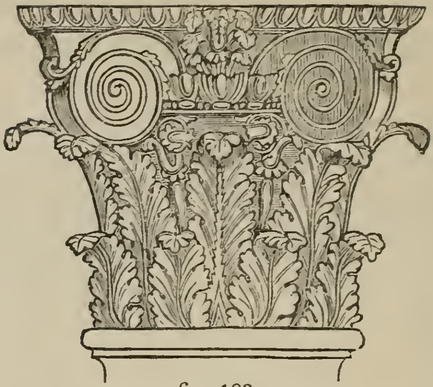


fig. 183.

2, 30, 2, 2, 5, 3¾, 1¾, 6½, 1¼, 2½, 9½, 3¾, 1, 8, 2¼. The projections, beginning with *b a*, are 26, 28, 29, 32½, 35, 35, 36, 52, 53½, 54, 66, 67, 70, 78.

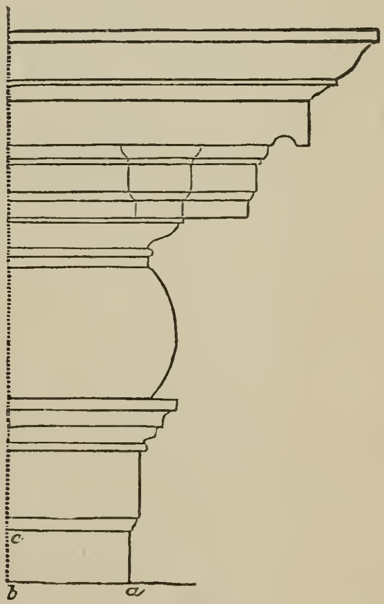


fig. 184.

The next example shows the manner of delineating intercolumniations. By this term is meant the distance between two columns, as *a* and *b*.

FIG. 185 is the intercolumniation of the Tuscan order. The distance between the columns is 6 diameters, the general distance, however, being 4 diameters. The pupil, at this stage of his proceedings, should make drawings to a large scale, as of that in fig. 152, of the intercolumniation of all the orders, to assist him in which we here give the various distances for each. The distance between the Doric columns is equal to three diameters; the distance in the Ionic is two diameters and a quarter; the distance between the columns in the Corinthian is two diameters and a quar-

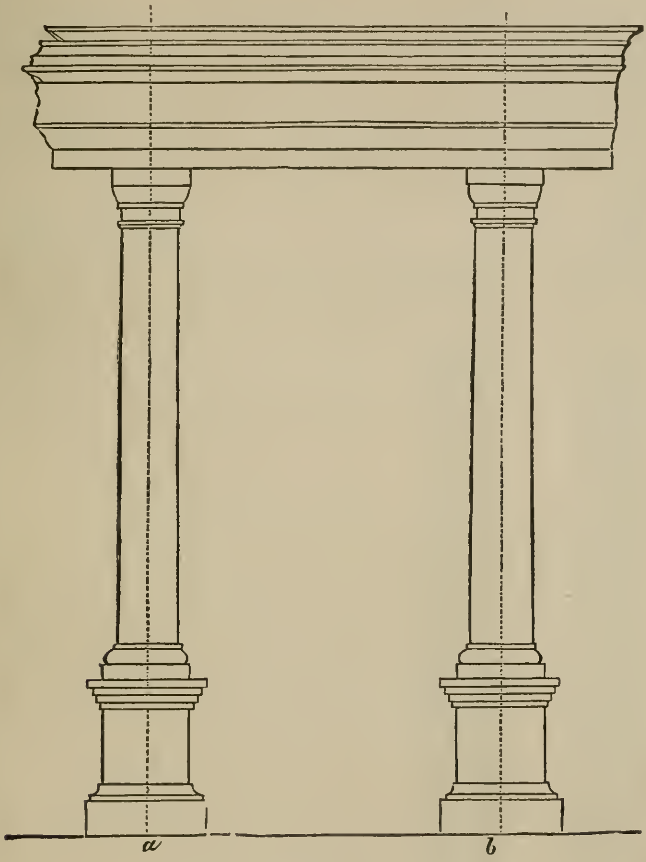


fig. 185.

ter; and that of the Composite one diameter and a quarter to one diameter and three quarters.

Where it is necessary to introduce doors, windows, &c., thus widening the space between the columns to a greater extent than true proportion requires, coupled columns are introduced, the distance between them being such as to allow of the proper projection of their capitals.

Fig. 186 shows coupled columns in the Corinthian order, where the space between the two columns is a little over two diameters.

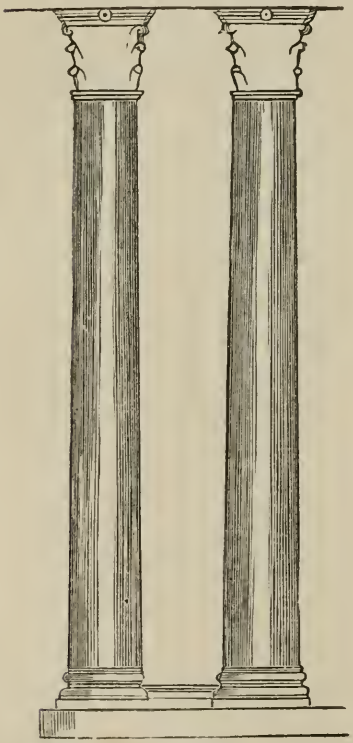


fig. 186.

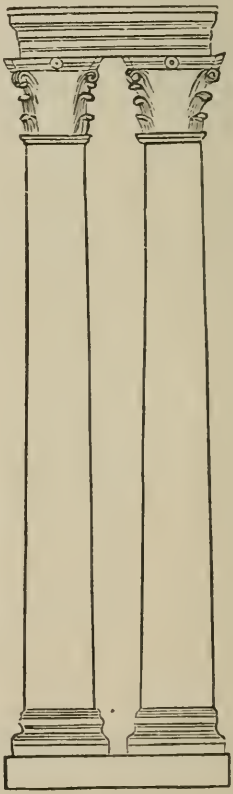


fig. 187.

Pilasters bear a considerable resemblance in their elevation to columns. The height of members and their projections are the same as the columns of the same order; the plan, however, instead of being circular, as in columns, is square, the external surface being flat.

Fig. 187 shows coupled pilasters in the Corinthian form.

Caryatides are sometimes used in place of columns and pilasters. These are representations of the human figure. When female, they are known by the name as above; when male, as Persians.

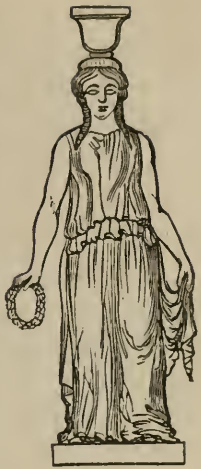


fig. 188.

Fig. 188 is an exemplification of a caryatides. As a series of columns at proper distances form a colonnade, so columns with arches between them are termed arcades. The Tuscan arcade is given in

Fig. 189. The distance between the columns *a* and *b* is six

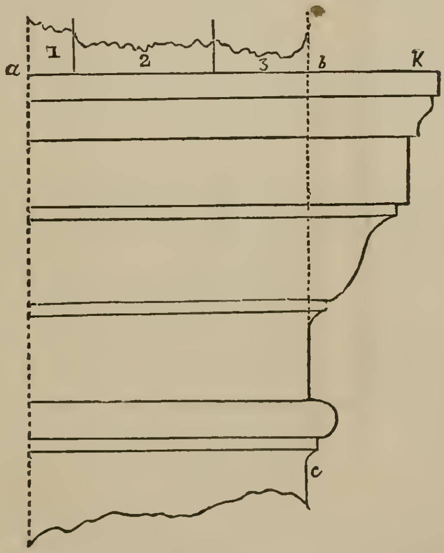


fig. 190.

diameters; A is termed a pier, B the impost, C the archivolt, and D the keystone. A semi-diameter of column is laid from *c* to *d*, which gives the line of pier, *h d*. The distance from *p* to *t* is six diameters and three quarters; a line through *t*, parallel to *a b*, gives the height of impost; the capital of impost is obtained by dividing *g h* into seven or eight equal parts, and giving one of these from *m* to *n*; the width of archivolt *s o* is equal to one ninth part of *g h*; the width of keystone at *e f* is equal to *o s*. By drawing lines to *e* and *f* from *t*, the diverging lines will be obtained.

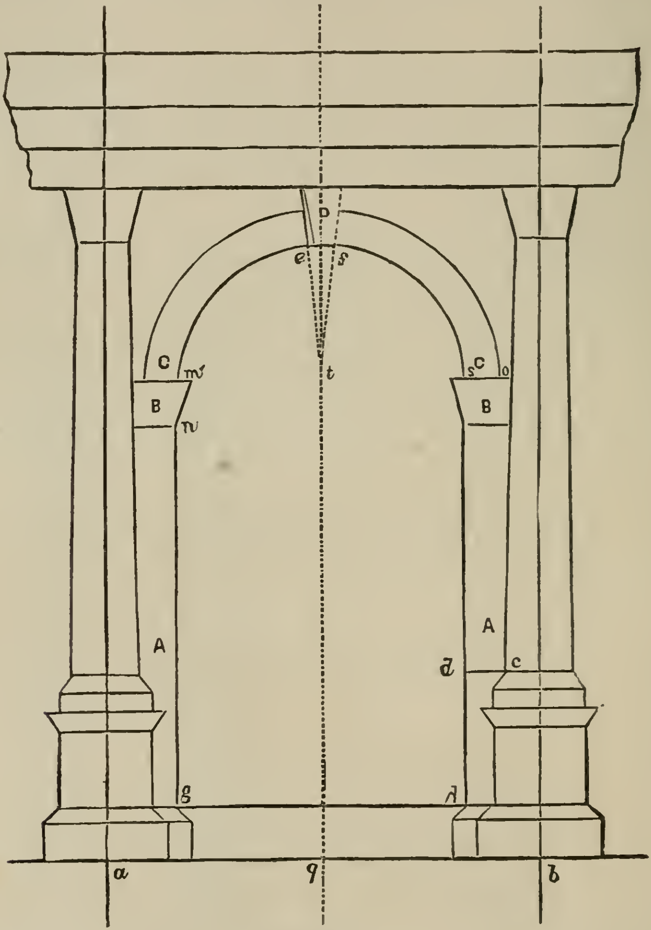


fig. 189.

To assist the pupil in making out examples of arcades in the other orders, we quote the following directions of a celebrated author on architecture, as to proportions: "The height of arches to the under side of their crowns should not exceed twice their clear width, nor should it be much less; the piers ought not to be less than one third the breadth of the arch, nor more than two thirds." The pupil desirous of studying the principles of architectural design may consult the previous section.

Fig. 190 is an elevation of the Tuscan impost, with the heights and projections. The projections are set forward from *b* to *k*, in the line *b c*, the line *b c* representing the face of pier corresponding to the line *g d* in fig. 189. The scale from which the measurements are taken is that in fig. 152. The figures 1, 2, and 3 denote the width of the mouldings on the archivolt, (see fig. 189,) and are set back on the line *a k* from *b*.

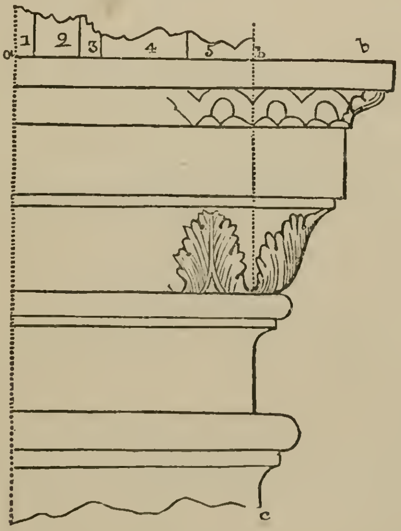


fig. 191.

Fig. 191 is the Doric impost. The heights are measured from the point *b*, on the line *b c*, representing the line of pier, as in last example, the projections being set forward from *b* to *t*, the width of mouldings of archivolt, 1, 2, 3, 4, 5, being from *b* towards *a*.

Fig. 192 is the Ionic impost, the projections, heights, and widths, 1, 2, &c., of archivolt mouldings being set out as in last figure.

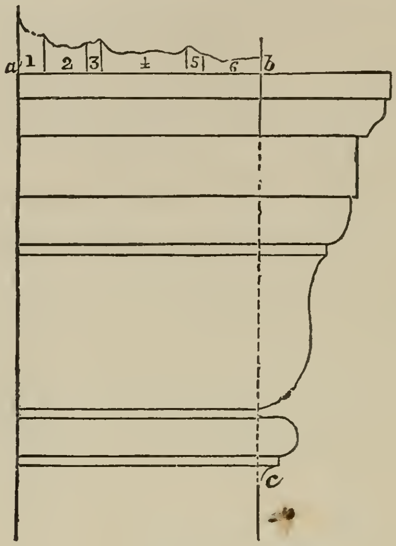


fig. 192.

Fig. 193 is the Corinthian impost. The projections being set

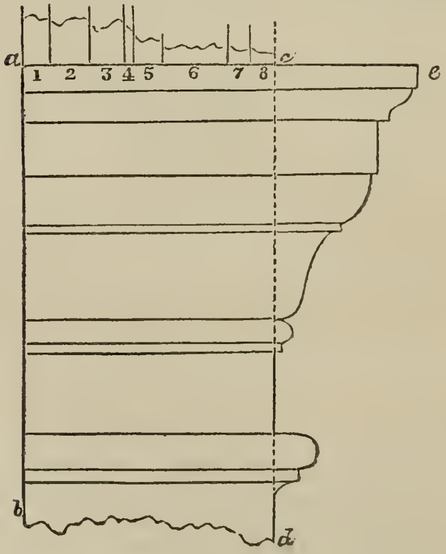


fig. 193.

out from the line *c d* towards *e*, the width of archivolt mouldings, 1, 2, 3, &c., as *a e*, from *c* towards *a*.

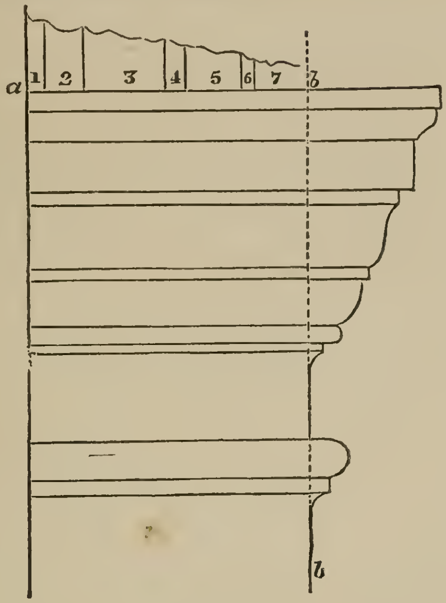


fig. 194.

Fig. 194 is the Composite impost, the projections being set from the line *b b*. The scale from which the measurements should be taken is the same for all the imposts, being that in fig. 152.

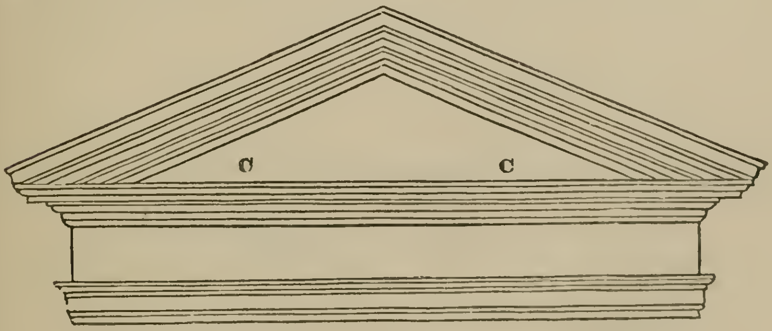


fig. 195.

Fig. 195 shows a PEDIMENT. c c, the tympanum, is generally filled in with sculpture. In the previous section is shown how geometry is made applicable to the construction of the various forms of arches, vases, and balustrades. We now give, in

Fig. 196, an elevation of the Tuscan balustrade; and in

Fig. 197, an elevation of the Ionic.

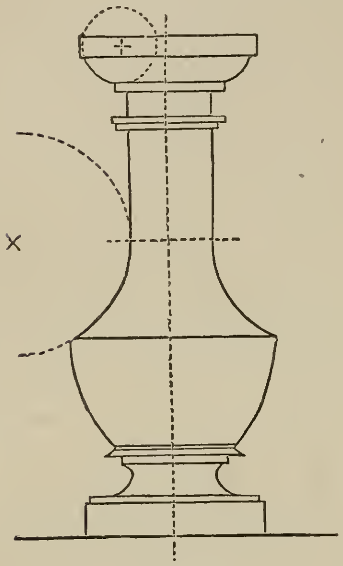


fig. 196.

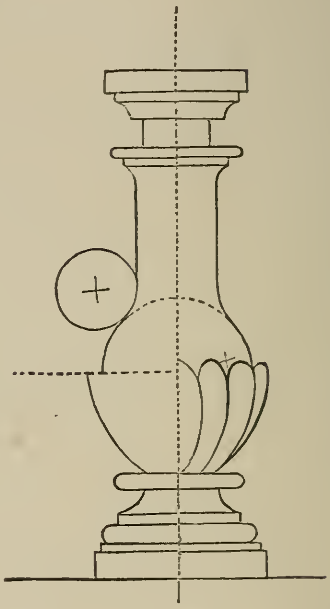


fig. 197.

ROOF FORMING.

It is not within the present design to give examples of frame work, as these are matters gleaned from master workmen. The few that follow are inserted with special reference to frames obviating lateral pressure.

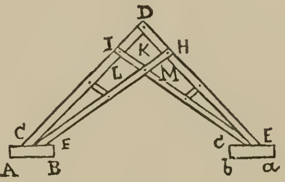
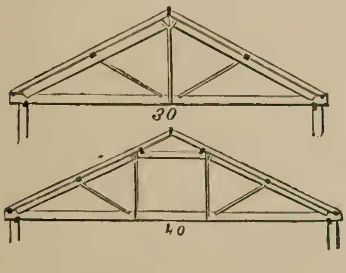


fig. 198.

To construct a roof which, without tie beams, shall have no lateral pressure on the walls: two rafters, C D, fig. 198, resting on the two beams A B and *b a*, are strongly jointed together at the summit D. From the angles C and E unite rafters that are well fastened at F G, at H and I, and to each other at K by means of a double notch. C E and D are also united to the other rafters by two cross-pieces at L and M.



figs. 199 and 200.

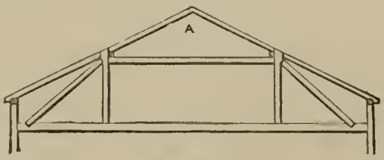


fig. 201.

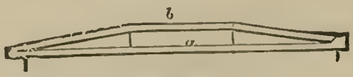


fig. 202.

Figs. 199 and 200 sufficiently explain themselves; they are 30 and 40 feet, as also 201 and 202.

Fig. 203 is a more complicated example, taken from "Benjamin's Elements." Fig. 203 exhibits the manner of measuring the strains caused by the peculiar position of the tie beams and other timbers of this construction of a roof. Make the base line A B equal to one half of the span of the roof. Make A D equal to the length and pitch of the rafter, and A C equal to the length and inclination of the tie beam. Measure from A down on the vertical line to *a*, nine tons, the load which rests on one side of the roof; continue D A down to *b*; draw *a* C parallel to A D, then *a* C measures thirty-one and a half tons, which is the strain on the rafter A D; now draw *a b* parallel to A C, the tie beam, and it will measure twenty-seven and a half tons, which is the strain on the tie beam.

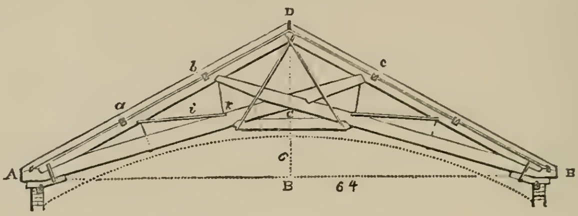


fig. 203.

If the tie beam had been placed in a horizontal position, then the strain would have been measured by drawing the vertical line *h o*, cutting the centre of the rafter A D at *o*; then draw D *h* parallel to A B, join *h* A, and then measure nine tons from *h* down to *o*; draw *o i*, and it will measure seven and a half tons, which is the horizontal thrust of the foot of the rafter at the end of the tie beam; and *h i* measures eleven and a half tons, which is the pressure on the rafter.

By these measures we are able to compare the various and complicated strains in this example with what they would have been had the tie beam been placed in a horizontal position. This comparison will show us the great difference caused by the position of the inclined tie beam, which knowledge will undoubtedly prove unfavorable to the use of this example unless it be from necessity.

We will now produce a few examples by which the less important strains on this or any other example of a roof may be measured.

The load on this roof, including its own weight when covered with slates, and its liability to heavy snows and high winds, is estimated at fifty pounds on each superficial foot. Hence, one pair of rafters sustains a vertical pressure of eighteen tons; each wall of the building, therefore, sustains a vertical pressure of nine tons. But these nine tons have four points of support upon each side of the roof; one of one and a half tons at A; one of three tons at *a*; one of the like weight at *b*; and another at the apex D, of one and a half tons on each side of the roof. The weight at *b* is sustained by that part of the tie beam above C, which here assumes the office of a strut, and is strained by a compression in the direction of its length, whilst the other end of the same timber is strained in a contrary direction. A is another point of support, on which rests three tons, one half of which is thrown by the strut *i* upon the tie beam at *k*. It is therefore apparent that the vertical load on each king post is six tons; hence, if the king post were placed in a vertical position, that would be the whole load; but as the king posts are necessarily inclined towards each other, the measure of the strain will be obtained by measuring on the vertical line D C, twelve tons, which is the weight the king post has to sustain from that point. Draw a line parallel to one of the king posts, and that line to where it cuts the opposite king post will measure seven tons; hence the breaking weight of each king post ought not to be less than twenty-eight tons.

The strut *i*, in consequence of its inclined position, is strained about six tons; its breaking weight, therefore, ought not to be less than twenty-four tons.

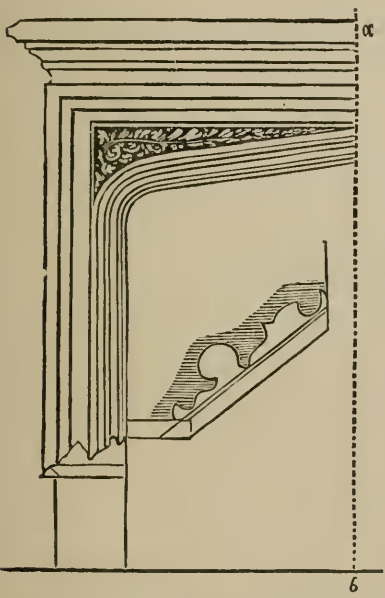
The severe strain of compression on the principal rafter renders it incapable of sustaining any considerable cross strain without producing deflection. It will at all times be hazardous to cause any considerable cross strains on a beam which is heavily loaded by a compression in the direction of its length; hence the precaution of throwing the weight on this roof upon supported points.

Size of timbers, &c., in this roof.

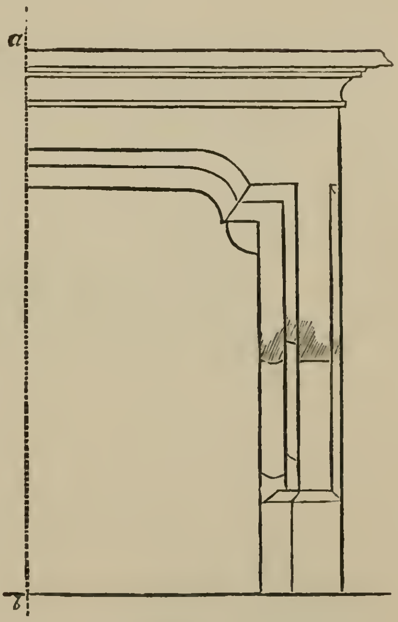
Inclined tie beams, ...	16 × 12
Principal rafters, ...	12 × 12
Struts, ...	12 × 3
Straining beam, ...	12 × 12
Purloins, ...	9 × 6
Small rafters, ...	8 × 2
King posts, ...	2½ × ¼
Straps at the foot of the rafter,	2 × ¼
Iron bolts, ...	⅞ inch square.

FIREPLACES.

FIG. 204 is in the Italian style; A shows the profile of the skirting-board running round the room, of which the lines at B show the front elevation.

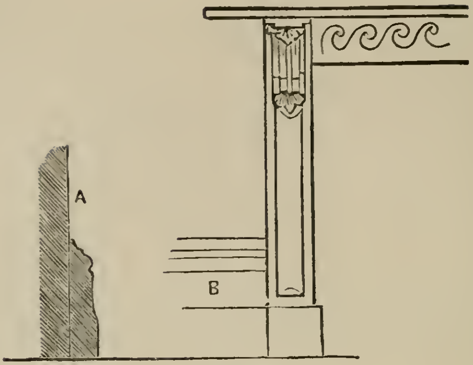


No. 204.

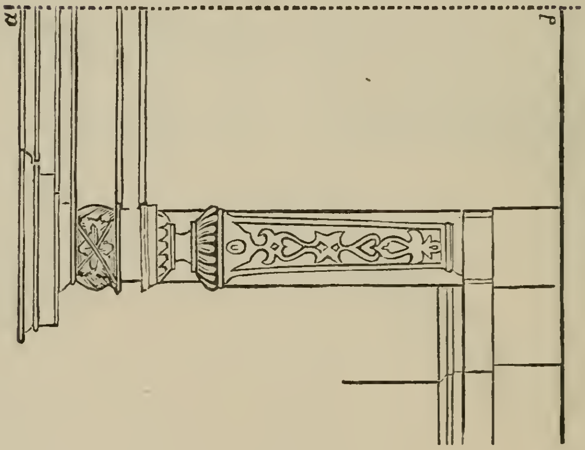


No. 205.

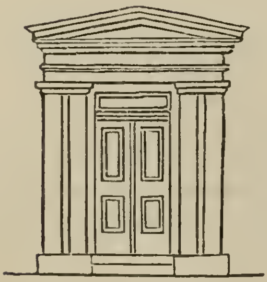
Fig. 205 is in the Elizabethan style. In these examples of fireplaces, we have only shown half, the other being an exact counterpart. The pupil should, however, draw them complete, the line A B being the centre line.



No. 206.

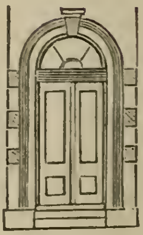


No. 207.



No. 208.

Nos. 208 and 209 are door elevations of different styles; in this part of the work are special items for all parts of inside finish.



No. 209.

TABLES AND RULES

FOR MEASURING VARIOUS SUPERFICIES AND SOLIDS.

A SQUARE foot (12×12=) 144 inches — yard, (3×3=) 9 feet, are the usual terms of measurement with ordinary artisans, as applied to superficies; and a cubic foot (12×12×12=) 1728 inches — yard (3×3×3=) 27 feet of solids.

To find the superficial contents of a *square*, a triangle, or a circle, we have to observe the proper rule of its figure; thus a *square* is the product of one of its sides into itself — as, 5 feet square, 5×5=25 feet. An *oblong* is the product of its length by the breadth, as, 5 by 7=35. A *triangle* superficies is found by multiplying the base by half the perpendicular, or any *oblique angle*, thus: Multiply the base by the perpendicular, and half the product will be the answer. *Circles* are measured thus: One half of the diameter into half the circumference gives the area. The circumference is 3 1-7 times the diameter, very nearly. When we have the diameter alone given, to find the area: Multiply its square by .7854, decimal; the product will be the area. The area of *ovals* is found by multiplying the longest diameter (called the transverse) by the shortest, (called conjugate,) and this product by the above decimal.

Cubes (bodies of six sides) are measured by multiplying length, breadth, and thickness together. *Cylinders* by multiplying the area of an end by the length. *Cones*, or bodies with circular base decreased to a point at the top, are measured by multiplying the area of the base by $\frac{1}{3}$ of the height. The superficies of a *globe* is found by multiplying the circumference by the diameter; and the solid contents may be found by multiplying the superficies by $\frac{1}{6}$ of its diameter, or multiply the cube of its diameter by .5236, decimal. Polygons may be measured by the following table: —

Sides.	Names.	Areas.	Sides.	Names.	Areas.
3	Triangle,	0.4330127	8	Octagon,	4.8284271
4	Square,	1.0000000	9	Nonagon,	6.1818242
5	Pentagon,	1.7204774	10	Decagon,	7.6942088
6	Hexagon,	2.5980762	11	Undecagon,	9.3656399
7	Heptagon,	3.6339124	12	Dodecagon,	11.1961524

These areas are for unity, or 1. Hence, to apply this table, we multiply the square of the given side by the area of the given polygon, as set down in the table, thus: What is the area of a dodecagon whose given side is 11 feet? 11×11×11.1961524=1344.7344404.

TABLE OF SUPERFICIAL OR FLAT MEASURE,

By which the contents in *Superficial Feet*, of Boards, Plank, Paving, &c., of any *Length* and *Breadth*, can be obtained, by multiplying the decimal expressed in the table by the length of the board, &c.

Breadth inches.	Area of a lineal foot.	Breadth inches.	Area of a lineal foot.	Breadth inches.	Area of a lineal foot.	Breadth inches.	Area of a lineal foot.
¼	.0208	3¼	.2708	6¼	.5208	9¼	.7708
½	.0417	3½	.2916	6½	.5416	9½	.7917
¾	.0625	3¾	.3125	6¾	.5625	9¾	.8125
1	.0834	4	.3334	7	.5833	10	.8334
1¼	.1042	4¼	.3542	7¼	.6042	10¼	.8542
1½	.125	4½	.375	7½	.625	10½	.875
1¾	.1459	4¾	.3958	7¾	.6458	10¾	.8959
2	.1667	5	.4167	8	.6667	11	.9167
2¼	.1875	5¼	.4375	8¼	.6875	11¼	.9375
2½	.2084	5½	.4583	8½	.7084	11½	.9583
2¾	.2292	5¾	.4792	8¾	.7292	11¾	.9792
3	.25	6	.5	9	.75	12	1.0000

ROUND AND EQUAL-SIDED TIMBER MEASURE.

Table for ascertaining the number of Cubical Feet, or Solid Contents, in a Stick of Round or Equal-Sided Timber, Tree, &c.

¼ girt in inches.	Area in feet.	¼ girt in inches.	Area in feet.	¼ girt in inches.	Area in feet.	¼ girt in inches.	Area in feet.	¼ girt in inches.	Area in feet.
6	.25	10¾	.803	15½	1.668	20¼	2.898	25	4.34
6¼	.272	11	.84	15¾	1.722	20½	2.917	25¼	4.428
6½	.294	11¼	.878	16	1.777	20¾	2.99	25½	4.516
6¾	.317	11½	.918	16¼	1.833	21	3.062	25¾	4.605
7	.34	11¾	.959	16½	1.89	21¼	3.136	26	4.694
7¼	.364	12	1.	16¾	1.948	21½	3.209	26¼	4.785
7½	.39	12¼	1.042	17	2.006	21¾	3.285	26½	4.876
7¾	.417	12½	1.085	17¼	2.066	22	3.362	26¾	4.969
8	.444	12¾	1.129	17½	2.126	22¼	3.438	27	5.062
8¼	.472	13	1.174	17¾	2.187	22½	3.516	27¼	5.158
8½	.501	13¼	1.219	18	2.25	22¾	3.598	27½	5.252
8¾	.531	13½	1.265	18¼	2.313	23	3.673	27¾	5.348
9	.562	13¾	1.313	18½	2.376	23¼	3.754	28	5.444
9¼	.594	14	1.361	18¾	2.442	23½	3.835	28¼	5.542
9½	.626	14¼	1.41	19	2.506	23¾	3.917	28½	5.64
9¾	.659	14½	1.46	19¼	2.574	24	4.	28¾	5.74
10	.694	14¾	1.511	19½	2.64	24¼	4.084	29	5.84
10¼	.73	15	1.562	19¾	2.709	24½	4.168	29¼	5.941
10½	.766	15¼	1.615	20	2.777	24¾	4.254	29½	6.044

TABLE SHOWING THE SOLID CONTENTS IN TIMBER, BOXES, PACKAGES, &c.

Rule to find Solid (or Cubic) Feet. — If all the dimensions are in *feet*, multiply the *length* by the *width*, and this *product* by the *depth*. If all the dimensions are in *feet and inches*, reduce the whole to inches, and multiply the *length*, *breadth*, and *depth* together, and divide the product by 1728, to obtain cubic feet.

The *width*, and *thickness* of the *timber* or *package* is given in the *top lines* of the tables. The column on the left contains, first, the length in *feet*, and below the length in *inches*. If the length of the timber or package is in feet and inches, add the feet and inches together.

If a timber or package be of larger thickness or breadth than is contained in the tables, add two numbers together, or double a number.

If the length of the timber is not contained in the table, take twice some length, or add two lengths together. Suppose a timber is 5 by 6 inches, and 22 feet long, — take twice 11, and you have 4 feet 8 inches.

Length		5 Inches thick by							6 Inches thick by						
ft.	in.	6 B	7 B	8 B	9 B	10 B	11 B	12 B	6 B	7 B	8 B	9 B	10 B	11 B	12 B
1	—	0 3	0 3	0 3	0 4	0 4	0 5	0 5	0 3	0 4	0 4	0 5	0 5	0 6	0 6
2	—	0 5	0 6	0 7	0 8	0 8	0 9	0 10	0 6	0 7	0 8	0 9	0 10	0 11	1 0
3	—	0 8	0 9	0 10	0 11	1 1	1 2	1 3	0 9	0 11	1 0	1 2	1 3	1 5	1 6
4	—	0 10	1 0	1 1	1 3	1 5	1 6	1 8	1 0	1 2	1 4	1 6	1 8	1 10	2 0
5	—	1 1	1 3	1 5	1 7	1 9	1 11	2 1	1 3	1 6	1 8	1 11	2 1	2 4	2 6
6	—	1 3	1 6	1 8	1 11	2 1	2 4	2 6	1 6	1 9	2 0	2 3	2 6	2 9	3 0
7	—	1 6	1 8	1 11	2 2	2 5	2 8	2 11	1 9	2 1	2 4	2 8	2 11	3 3	3 6
8	—	1 8	1 11	2 3	2 6	2 9	3 1	3 4	2 0	2 4	2 8	3 0	3 4	3 8	4 0
9	—	1 11	2 2	2 6	2 10	3 2	3 5	3 9	2 3	2 8	3 0	3 5	3 9	4 2	4 6
10	—	2 1	2 5	2 9	3 2	3 6	3 10	4 2	2 6	2 11	3 4	3 9	4 2	4 7	5 0
11	—	2 4	2 8	3 1	3 5	3 10	4 2	4 7	2 9	3 3	3 8	4 2	4 7	5 1	5 6
12	—	2 6	2 11	3 4	3 9	4 2	4 7	5 0	3 0	3 6	4 0	4 6	5 0	5 6	6 0
13	—	2 9	3 2	3 7	4 1	4 6	5 0	5 5	3 3	3 10	4 4	4 11	5 5	6 0	6 6
14	—	2 11	3 5	3 11	4 5	4 10	5 4	5 10	3 6	4 1	4 8	5 3	5 10	6 5	7 0
15	—	3 2	3 8	4 2	4 8	5 3	5 9	6 3	3 9	4 5	5 0	5 8	6 3	6 11	7 6
20	—	4 2	4 10	5 7	6 3	6 11	7 8	8 4	5 0	5 10	6 8	7 6	8 4	9 2	10 0
25	—	5 3	6 1	6 11	7 10	8 8	9 7	10 5	6 3	7 4	8 4	9 5	10 5	11 6	12 6
30	—	6 3	7 4	8 4	9 5	10 5	11 6	12 6	7 6	8 9	10 0	11 3	12 6	13 9	15 0
36	—	7 6	8 9	10 0	11 3	12 6	13 9	15 0	9 0	10 6	12 0	13 6	15 0	16 6	18 0
—	1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 1
—	2	0 0	0 0	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1
—	3	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 2
—	6	0 1	0 1	0 2	0 2	0 2	0 2	0 3	0 2	0 2	0 2	0 2	0 3	0 3	0 3

Length		7 Inches thick by							8 Inches thick by						
ft.	in.	7 B	8 B	9 B	10 B	11 B	12 B	13 B	8 B	9 B	10 B	11 B	12 B	13 B	14 B
1	—	0 4	0 5	0 5	0 6	0 6	0 7	0 8	0 5	0 6	0 7	0 7	0 8	0 9	0 9
2	—	0 8	0 9	0 11	1 0	1 1	1 2	1 3	0 11	1 0	1 1	1 3	1 4	1 5	1 7
3	—	1 0	1 2	1 4	1 6	1 7	1 9	1 11	1 4	1 6	1 8	1 10	2 0	2 2	2 4
4	—	1 4	1 7	1 9	1 11	2 2	2 4	2 6	1 9	2 0	2 3	2 5	2 8	2 11	3 1
5	—	1 8	1 11	2 2	2 5	2 8	2 11	3 2	2 3	2 6	2 9	3 1	3 4	3 7	3 11
6	—	2 1	2 4	2 8	2 11	3 3	3 6	3 10	2 8	3 0	3 4	3 8	4 0	4 4	4 8
7	—	2 5	2 9	3 1	3 5	3 9	4 1	4 5	3 1	3 6	3 11	4 3	4 8	5 1	5 5
8	—	2 9	3 1	3 6	3 11	4 3	4 8	5 1	3 7	4 0	4 5	4 11	5 4	5 9	6 3
9	—	3 1	3 6	3 11	4 5	4 10	5 3	5 8	4 0	4 6	5 0	5 6	6 0	6 6	7 0
10	—	3 5	3 11	4 5	4 10	5 4	5 10	6 4	4 5	5 0	5 7	6 1	6 8	7 3	7 9
11	—	3 9	4 3	4 10	5 4	5 11	6 5	6 11	4 11	5 6	6 1	6 9	7 4	7 11	8 7
12	—	4 1	4 8	5 3	5 10	6 5	7 0	7 7	5 4	6 0	6 8	7 4	8 0	8 8	9 4
13	—	4 5	5 1	5 8	6 4	6 11	7 7	8 3	5 9	6 6	7 2	7 11	8 8	9 5	10 1
14	—	4 9	5 5	6 2	6 10	7 6	8 2	8 10	6 3	7 0	7 9	8 7	9 4	10 1	10 11
15	—	5 1	5 10	6 7	7 4	8 0	8 9	9 6	6 8	7 6	8 4	9 2	10 0	10 10	11 8
20	—	6 10	7 9	8 9	9 9	10 8	11 8	12 8	8 11	10 0	11 1	12 3	13 4	14 5	15 7
25	—	8 6	9 9	10 11	12 2	13 4	14 7	15 10	11 1	12 6	13 11	15 3	16 8	18 1	19 5
30	—	10 3	11 8	13 2	14 7	16 1	17 6	19 0	13 4	15 0	16 8	18 4	20 0	21 8	23 4
36	—	12 3	14 0	15 9	17 6	19 3	21 0	22 9	16 0	18 0	20 0	22 0	24 0	26 0	28 0
—	1	0 0	0 0	0 0	0 0	0 1	0 1	0 1	0 0	0 1	0 1	0 1	0 1	0 1	0 1
—	2	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 2
—	3	0 1	0 1	0 1	0 1	0 2	0 2	0 2	0 1	0 2	0 2	0 2	0 2	0 2	0 2
—	6	0 2	0 2	0 3	0 3	0 3	0 4	0 4	0 3	0 3	0 3	0 4	0 4	0 4	0 5

Length		9 Inches thick by														10 Inches thick by													
ft.	in.	9	B	10	B	11	B	12	B	13	B	14	B	15	B	10	B	11	B	12	B	13	B	14	B	15	B	16	B
1	—	0	7	0	8	0	8	0	9	0	10	0	11	0	11	0	8	0	9	0	10	0	11	1	0	1	1	1	1
2	—	1	2	1	3	1	5	1	6	1	8	1	9	1	11	1	5	1	6	1	8	1	10	1	11	2	1	2	3
3	—	1	8	1	11	2	1	2	3	2	5	2	8	2	10	2	1	2	4	2	6	2	9	2	11	3	2	3	4
4	—	2	3	2	6	2	9	3	0	3	3	3	6	3	9	2	9	3	1	3	4	3	7	3	11	4	2	4	5
5	—	2	10	3	2	3	5	3	9	4	1	4	5	4	8	3	6	3	10	4	2	4	6	4	10	5	3	5	7
6	—	3	5	3	9	4	2	4	6	4	11	5	3	5	8	4	2	4	7	5	0	5	5	5	10	6	3	6	8
7	—	3	11	4	5	4	10	5	3	5	8	6	2	6	7	4	10	5	4	5	10	6	4	6	10	7	4	7	9
8	—	4	6	5	0	5	6	6	0	6	6	7	0	7	6	5	7	6	1	6	8	7	3	7	9	8	4	8	11
9	—	5	1	5	8	6	2	6	9	7	4	7	11	8	5	6	3	6	11	7	6	8	2	8	9	9	5	10	0
10	—	5	8	6	3	6	11	7	6	8	2	8	9	9	5	6	11	7	8	8	4	9	0	9	9	10	5	11	1
15	—	8	5	9	5	10	4	11	3	12	2	13	2	14	1	10	5	11	6	12	6	13	7	14	7	15	8	16	8
20	—	11	3	12	6	13	9	15	0	16	3	17	6	18	9	13	11	15	3	16	8	18	1	19	5	20	10	22	3
25	—	14	1	15	8	17	2	18	9	20	4	21	11	23	5	17	4	19	1	20	10	22	7	24	4	26	1	27	9
30	—	16	11	18	9	20	8	22	6	24	5	26	3	28	2	20	10	22	11	25	0	27	1	29	2	31	3	33	4
36	—	20	3	22	6	24	9	27	0	29	3	31	6	33	9	25	0	27	6	30	0	32	6	35	0	37	6	40	0
—	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
—	2	0	1	0	1	0	1	0	2	0	2	0	2	0	2	0	1	0	2	0	2	0	2	0	2	0	2	0	2
—	3	0	2	0	2	0	2	0	2	0	2	0	3	0	3	0	2	0	2	0	3	0	3	0	3	0	3	0	3
—	6	0	3	0	4	0	4	0	5	0	5	0	5	0	6	0	4	0	5	0	5	0	5	0	6	0	6	0	7

Length		11 Inches thick by														12 Inches thick by													
ft.	in.	11	B	12	B	13	B	14	B	15	B	16	B	17	B	12	B	13	B	14	B	15	B	16	B	17	B	18	B
1	—	0	10	0	11	1	0	1	1	1	2	1	3	1	4	1	0	1	1	1	6	1	3	1	8	1	5	1	6
2	—	1	8	1	10	2	0	2	2	2	4	2	5	2	7	2	0	2	2	2	8	2	6	2	0	2	10	3	0
3	—	2	6	2	9	3	0	3	3	3	5	3	8	3	11	3	0	3	3	3	2	3	9	4	4	4	3	4	6
4	—	3	4	3	8	4	0	4	3	4	7	4	11	5	2	4	0	4	4	4	4	5	0	5	8	5	8	6	0
5	—	4	2	4	7	5	0	5	4	5	9	6	1	6	6	5	0	5	5	5	10	6	3	6	0	7	1	7	6
6	—	5	1	5	6	6	0	6	5	6	11	7	4	7	10	6	0	6	6	7	0	7	6	8	4	8	6	9	0
7	—	5	11	6	5	6	11	7	6	8	0	8	7	9	1	7	0	7	7	8	2	8	9	9	8	9	11	10	6
8	—	6	9	7	4	7	11	8	7	9	2	9	9	10	5	8	0	8	8	9	4	10	0	10	0	11	4	12	0
9	—	7	7	8	3	8	11	9	8	10	4	11	0	11	8	9	0	9	9	10	6	11	3	12	4	12	9	13	6
10	—	8	5	9	2	9	11	10	8	11	6	12	3	13	0	10	0	10	10	11	8	12	6	13	0	14	2	15	0
15	—	12	7	13	9	14	11	16	1	17	2	18	4	19	6	15	0	16	3	17	6	18	9	20	8	21	3	22	6
20	—	16	10	18	4	19	10	21	5	22	11	24	5	26	0	20	0	21	8	23	4	25	0	26	4	28	4	30	0
25	—	21	0	22	11	24	10	26	9	28	8	30	7	32	6	25	0	27	1	29	2	31	3	33	0	35	5	37	6
30	—	25	3	27	6	29	10	32	1	34	5	36	8	39	0	30	0	32	6	35	0	37	6	40	0	42	6	45	0
36	—	30	3	33	0	35	9	38	6	41	3	44	0	46	9	36	0	39	0	42	0	45	0	48	1	51	0	54	0
—	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	3	0	1	0	2
—	2	0	2	0	2	0	2	0	2	0	2	0	2	0	3	0	2	0	2	0	2	0	3	0	4	0	5	0	3
—	3	0	3	0	3	0	3	0	3	0	3	0	4	0	4	0	3	0	3	0	4	0	4	0	4	0	4	0	5
—	6	0	5	0	6	0	6	0	6	0	7	0	7	0	8	0	6	0	7	0	7	0	8	0	8	0	9	0	9

Length		13 Inches thick by														14 Inches thick by													
ft.	in.	13	B	14	B	15	B	16	B	17	B	18	B	19	B	14	B	15	B	16	B	17	B	18	B	19	B	20	B
1	—	1	2	1	3	1	4	1	5	1	6	1	8	1	9	1	4	1	6	1	7	1	8	1	9	1	10	1	11
2	—	2	4	2	6	2	9	2	11	3	1	3	3	3	5	2	9	2	11	3	1	3	4	3	6	3	8	3	11
3	—	3	6	3	10	4	1	4	4	4	7	4	11	5	2	4	1	4	5	4	8	5	0	5	3	5	7	5	10
4	—	4	8	5	1	5	5	5	9	6	2	6	6	6	10	5	5	5	10	6	3	6	7	7	0	7	5	7	9
5	—	5	10	6	4	6	9	7	3	7	8	8	2	8	7	6	10	7	4	7	9	8	3	8	9	9	3	9	9
6	—	7	1	7	7	8	2	8	8	9	3	9	9	10	4	8	2	8	9	9	4	9	11	10	6	11	1	11	8
7	—	8	3	8	10	9	6	10	1	10	9	11	5	12	0	9	6	10	3	10	11	11	7	12	3	12	11	13	7
8	—	9	5	10	1	10	10	11	7	12	3	13	0	13	9	10	11	11	8	12	5	13	3	14	0	14	9	15	7
9	—	10	7	11	5	12	2	13	0	13	10	14	8	15	5	12	3	13	2	14	0	14	11	15	9	16	8	17	6
10	—	11	9	12	8	13	7	14	5	15	4	16	3	17	2	13	7	14	7	15	7	16	6	17	6	18	6	19	5
15	—	17	7	19	0	20	4	21	8	23	0	24	5	25	9	20	5	21	11	23	4	24	10	26	3	27	9	29	2
20	—	23	6	25	3	27	1	28	11	30	8	32	6	34	4	27	3	29	2	31	1	33	1	35	0	36	11	38	11
25	—	29	4	31	7	33	10	36	1	38	4	40	8	42	11	34	0	36	6	38	11	41	4	43	9	46	2	48	7
30	—	35	3	37	11	40	8	43	4	46	1	48	9	51	6	40	10	43	9	46	8	49	7	52	6	55	5	58	4
36	—	42	3	45	6	48	9	52	0	55	3	58	6	61	9	49	0	52	6	56	0	59	6	63	0	66	6	70	0
—	1	0	1	0	1	0	1	0	1	0	2	0	2	0	2	0	1	0	1	0	2	0	2	0	2	0	2	0	2
—	2	0	2	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	4	0	4	0	4
—	3	0	4	0	4	0	4	0	4	0	5	0	5	0	5	0	4	0	4	0	5	0	5	0	5	0	6	0	6
—	6	0	7	0	8	0	8	0	9	0	9	0	10	0	10	0	8	0	9	0	9	0	10	0	11	0	11	1	0

Length		15 Inches thick by													
ft.	in.	15	B	16	B	17	B	18	B	19	B	20	B	21	B
1	—	1	7	1	8	1	9	1	11	2	0	2	1	2	2
2	—	3	2	3	4	3	7	3	9	4	0	4	2	4	5
3	—	4	8	5	0	5	4	5	8	5	11	6	3	6	7
4	—	6	3	6	8	7	1	7	6	7	11	8	4	8	9
5	—	7	10	8	4	8	10	9	5	9	11	10	5	10	11
6	—	9	5	10	0	10	8	11	3	11	11	12	6	13	2
7	—	10	11	11	8	12	5	13	2	13	10	14	7	15	4
8	—	12	6	13	4	14	2	15	0	15	10	16	8	17	6
9	—	14	1	15	0	15	11	16	11	17	10	18	9	19	8
10	—	15	8	16	8	17	9	18	9	19	10	20	10	21	11
15	—	23	5	25	0	26	7	28	2	29	8	31	3	32	10
20	—	31	3	33	4	35	5	37	6	39	7	41	8	43	9
25	—	39	1	41	8	44	3	46	11	49	6	52	1	54	8
30	—	46	11	50	0	53	2	56	3	59	5	62	6	65	8
36	—	56	3	60	0	63	9	67	6	71	3	75	0	78	9
—	1	0	2	0	2	0	2	0	2	0	2	0	2	0	2
—	2	0	3	0	3	0	4	0	4	0	4	0	4	0	4
—	3	0	5	0	5	0	5	0	6	0	6	0	6	0	7
—	6	0	9	0	10	0	11	0	11	1	0	1	1	1	1

Length		16 Inches thick by													
ft.	in.	16	B	17	B	18	B	19	B	20	B	21	B	22	B
1	—	1	9	1	11	2	0	2	1	2	3	2	2	2	5
2	—	3	7	3	9	4	0	4	3	4	5	4	4	4	11
3	—	5	4	5	8	6	0	6	4	6	8	7	8	7	4
4	—	7	1	7	7	8	0	8	5	8	11	9	0	9	9
5	—	8	11	9	5	10	0	10	7	11	1	11	4	12	3
6	—	10	8	11	4	12	0	12	8	13	4	14	8	14	8
7	—	12	5	13	3	14	0	14	9	15	7	16	0	17	1
8	—	14	3	15	1	16	0	16	11	17	9	18	4	19	7
9	—	16	0	17	0	18	0	19	0	20	0	21	8	22	0
10	—	17	9	18	11	20	0	21	1	22	3	23	0	24	5
15	—	26	8	28	4	30	0	31	8	33	4	35	4	36	8
20	—	35	7	37	9	40	0	42	3	44	5	46	0	48	11
25	—	44	5	47	3	50	0	52	9	55	7	58	8	61	1
30	—	53	4	56	8	60	0	63	4	66	8	70	4	73	4
36	—	64	0	68	0	72	0	76	0	80	0	84	0	88	0
—	1	0	2	0	2	0	2	0	2	0	2	0	0	0	2
—	2	0	4	0	4	0	4	0	4	0	4	0	2	0	5
—	3	0	5	0	6	0	6	0	6	0	7	0	5	0	7
—	6	0	11	0	11	1	0	1	1	1	1	1	7	1	3

Length		17 Inches thick by													
ft.	in.	17	B	18	B	19	B	20	B	21	B	22	B	23	B
1	—	2	0	2	2	2	3	2	4	2	6	2	7	2	9
2	—	4	0	4	3	4	6	4	9	5	0	5	2	5	5
3	—	6	0	6	5	6	9	7	1	7	5	7	10	8	2
4	—	8	0	8	6	9	0	9	5	9	11	10	5	10	10
5	—	10	0	10	8	11	3	11	10	12	5	13	0	13	7
6	—	12	1	12	9	13	6	14	2	14	11	15	7	16	4
7	—	14	1	14	11	15	8	16	6	17	4	18	2	19	0
8	—	16	1	17	0	17	11	18	11	19	10	20	9	21	9
9	—	18	1	19	2	20	2	21	3	22	4	23	5	24	5
10	—	20	1	21	3	22	5	23	7	24	10	26	0	27	2
15	—	30	1	31	11	33	8	35	5	37	2	39	0	40	9
20	—	40	2	42	6	44	10	47	3	49	7	51	11	54	4
25	—	50	2	53	2	56	1	59	0	62	0	64	11	67	11
30	—	60	3	63	9	67	4	70	10	74	5	77	11	81	6
36	—	72	3	76	6	80	9	85	0	89	3	93	6	97	9
—	1	0	2	0	2	0	2	0	2	0	2	0	3	0	3
—	2	0	4	0	4	0	4	0	5	0	5	0	5	0	5
—	3	0	6	0	6	0	7	0	7	0	7	0	8	0	8
—	6	1	0	1	1	1	1	1	2	1	3	1	4	1	4

Length		18 Inches thick by											
ft.	in.	18	B	19	B	20	B	21	B	22	B	23	B
1	—	2	3	2	5	2	6	2	8	2	9	2	11
2	—	4	6	4	9	5	0	5	3	5	6	5	9
3	—	6	9	7	2	7	6	7	11	8	3	8	8
4	—	9	0	9	6	10	0	10	6	11	0	11	6
5	—	11	3	11	11	12	6	13	2	13	9	14	5
6	—	13	6	14	3	15	0	15	9	16	6	17	3
7	—	15	9	16	8	17	6	18	5	19	3	20	2
8	—	18	0	19	0	20	0	21	0	22	0	23	0
9	—	20	3	21	5	22	6	23	8	24	9	25	11
10	—	22	6	23	9	25	0	26	3	27	6	28	9
15	—	33	9	35	8	37	6	39	5	41	3	43	2
20	—	45	0	47	6	50	0	52	6	55	0	57	6
25	—	56	3	59	5	62	6	65	8	68	9	71	11
30	—	67	6	71	3	75	0	78	9	82	6	86	3
36	—	81	0	85	6	90	0	94	6	99	0	103	6
—	1	0	2	0	2	0	3	0	3	0	3	0	3
—	2	0	5	0	5	0	5	0	5	0	6	0	6
—	3	0	7	0	7	0	8	0	8	0	8	0	9
—	6	1	2	1	2	1	3	1	4	1	5	1	5

Length		19 Inches thick by											
ft.	in.	19	B	20	B	21	B	22	B	23	B	24	B
1	—	2	6	2	8	2	9	2	11	3	0	3	2
2	—	5	0	5	3	5	7	5	10	6	1	6	4
3	—	7	6	7	11	8	4	8	9	9	1	9	6
4	—	10	0	10	7	11	1	11	7	12	2	12	8
5	—	12	6	13	2	13	10	14	6	15	2	15	10
6	—	15	1	15	10	16	8	17	5	18	3	19	0
7	—	17	7	18	6	19	5	20	4	21	3	22	2
8	—	20	1	21	1	22	2	23	3	24	3	25	4
9	—	22	7	23	9	24	11	26	2	27	4	28	6
10	—	25	1	26	5	27	9	29	0	30	4	31	8
15	—	37	7	39	7	41	7	43	7	45	6	47	6
20	—	50	2	52	9	55	5	58	1	60	8	63	4
25	—	62	8	66	0	69	3	72	7	75	10	79	2
30	—	75	3	79	2	83	2	87	1	91	1	95	0
36	—	90	3	95	0	99	9	104	6	109	3	114	0
—	1	0	3	0	3	0	3	0	3	0	3	0	3
—	2	0	5	0	5	0	6	0	6	0	6	0	6
—	3	0	8	0	8	0	8	0	9	0	9	0	10
—	6	1	3	1	4	1	5	1	5	1	6	1	7

Length		20 Inches thick by											
ft.	in.	20	B	21	B	22	B	23	B	24	B	25	B
1	—	2	9	2	11	3	1	3	2	3	4	3	6
2	—	5	7	5	10	6	1	6	5	6	8	6	11
3	—	8	4	8	9	9	2	9	7	10	0	10	5
4	—	11	1	11	8	12	3	12	9	13	4	13	11
5	—	13	11	14	7	15	3	16	0	16	8	17	4
6	—	16	8	17	6	18	4	19	2	20	0	20	10
7	—	19	5	20	5	21	5	22	4	23	4	24	4
8	—	22	3	23	4	24	5	25	7	26	8	27	9
9	—	25	0	26	3	27	6	28	9	30	0	31	3
10	—	27	9	29	2	30	7	31	11	33	4	34	9
15	—	41	8	43	9	45	10	47	11	50	0	52	1
20	—	55	7	58	4	61	1	63	11	66	8	69	5
25	—	69	5	72	11	76	5	79	10	83	4	86	10
30	—	83	4	87	6	91	8	95	10	100	0	104	2
36	—	100	0	105	0	110	0	115	0	120	0	125	0
—	1	0	3	0	3	0	3	0	3	0	3	0	3
—	2	0	6	0	6	0	6	0	6	0	7	0	7
—	3	0	8	0	9	0	9	0	10	0	10	0	10
—	6	1	5	1	6	1	6	1	7	1	8	1	9

PLANK AND SCANTLING MEASURE.

If a plank be longer than is represented in the tables, then take *twice* some *length.* If shorter, take ½ or ¼ of some *length.*

2 Inches Thick, by 10 to 28 Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
13	22	24	26	28	30	33	35	37	39	41	43	46	48	50	52	54	56	59	61
14	23	26	28	30	33	35	37	40	42	44	47	49	51	54	56	58	61	63	65
15	25	28	30	33	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70
16	27	29	32	35	37	40	43	45	48	51	53	56	59	61	64	67	69	72	75
17	28	31	34	37	40	43	45	48	51	54	57	60	62	65	68	71	74	77	79
18	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84
19	32	35	38	41	44	48	51	54	57	60	63	67	70	73	76	79	82	86	89
20	33	37	40	43	47	50	53	57	60	63	67	70	73	77	80	83	87	90	93
21	35	39	42	46	49	53	56	60	63	67	70	74	77	81	84	88	91	95	98
22	37	40	44	48	51	55	59	62	66	70	73	77	81	84	88	92	95	99	103
23	38	42	46	50	54	58	61	65	69	73	77	81	84	88	92	96	100	104	107
24	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112
25	42	46	50	54	58	63	67	71	75	79	83	88	92	96	100	104	108	113	117
26	43	48	52	56	61	65	69	74	78	82	87	91	95	100	104	108	113	117	121
27	45	50	54	59	63	68	72	77	81	86	90	95	99	104	108	113	117	122	126
28	47	51	56	61	65	70	75	79	84	89	93	98	103	107	112	117	121	126	131
29	48	53	58	63	68	73	77	82	87	92	97	102	106	111	116	121	126	131	135
30	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140

2 1-2 Inches Thick by 10 to 27 Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
13	27	30	33	35	38	41	43	46	49	51	54	57	60	62	65	68	70	73
14	29	32	35	38	41	44	47	50	53	55	58	61	64	67	70	73	76	79
15	31	34	38	41	44	47	50	53	56	59	63	66	69	72	75	78	81	84
16	33	37	40	43	47	50	53	57	60	63	67	70	73	77	80	83	87	90
17	35	39	43	46	50	53	57	60	64	67	71	74	78	81	85	89	92	96
18	38	41	45	49	53	56	60	64	68	71	75	79	83	86	90	94	98	101
19	40	44	48	51	55	59	63	67	71	75	79	83	87	91	95	99	103	107
20	42	46	50	54	58	63	67	71	75	79	83	88	92	96	100	104	108	113
21	44	48	53	57	61	66	70	74	79	83	88	92	96	101	105	109	114	118
22	46	50	55	60	64	69	73	78	83	87	92	96	101	105	110	115	119	124
23	48	53	58	62	67	72	77	81	86	91	96	101	105	110	115	120	125	129
24	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135
25	52	57	63	68	73	78	83	89	94	99	104	109	115	120	125	130	135	141
26	54	60	65	70	76	81	87	92	93	102	108	114	119	125	130	135	141	146
27	56	62	68	73	79	84	90	96	101	107	113	118	124	129	135	141	146	152
28	58	64	70	76	82	88	93	99	105	111	117	123	128	134	140	146	152	158
29	60	66	73	79	85	91	97	103	109	115	121	127	133	139	145	151	157	163
30	63	69	75	81	88	94	100	106	113	119	125	131	138	144	150	156	163	169

3 Inches Thick by 10 to 27 Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13	33	36	39	42	46	49	52	55	59	62	65	68	72	75	78	81	85
14	35	39	42	46	49	53	56	60	63	67	70	74	77	81	84	88	91
15	38	41	45	49	53	56	60	64	68	71	75	79	83	86	90	94	98
16	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104
17	43	47	51	55	60	64	68	72	77	81	85	89	94	98	102	106	111
18	45	50	54	59	63	68	72	77	81	86	90	95	99	104	108	113	117
19	48	52	57	62	67	71	76	81	86	90	95	100	105	109	114	119	124
20	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
21	53	58	63	68	74	79	84	89	95	100	105	110	116	121	126	131	137
22	55	61	66	72	77	83	88	94	99	105	110	116	121	127	132	138	143
23	58	63	69	75	81	86	92	98	104	109	115	121	127	132	138	144	150
24	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156
25	63	69	75	81	88	94	100	106	113	119	125	131	138	144	150	156	163
26	65	72	78	85	91	98	104	111	117	124	130	137	143	150	156	163	169
27	68	74	81	88	95	101	108	115	122	128	135	142	149	155	162	169	176
28	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
29	73	80	87	94	102	109	116	123	131	138	145	152	160	167	174	181	189
30	75	83	90	98	105	113	120	128	135	143	150	158	165	173	180	188	195

PLANK AND SCANTLING MEASURE.

If a plank or scantling be longer than is represented in the tables, take *twice* some *length* given in the tables, or add two *lengths* together; if wider, take *two widths*; if both longer and wider, double the contents of such number in the tables as will give the same length and width required.

3 1-2 Inches Thick by **10** to **26** Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13	38	42	46	49	53	57	61	64	68	72	76	80	83	87	91	95	99
14	41	45	49	53	57	61	65	69	74	78	82	86	90	94	98	102	106
15	44	48	53	57	61	66	70	74	79	83	88	92	96	101	105	109	114
16	47	51	56	61	65	70	75	79	84	89	93	98	103	107	112	117	121
17	50	55	60	64	69	71	79	84	89	94	99	104	109	114	119	124	129
18	53	58	63	63	74	79	84	89	95	100	105	110	116	121	126	131	137
19	55	61	67	72	78	83	89	94	100	105	111	116	122	127	133	139	144
20	58	64	70	76	82	88	93	99	105	111	117	123	128	134	140	146	152
21	61	67	74	80	86	92	98	104	110	116	123	129	135	141	147	153	159
22	64	71	77	83	90	96	103	109	116	122	128	135	141	148	154	160	167
23	67	74	81	87	94	101	107	114	121	127	134	141	148	154	161	168	174
24	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
25	73	80	88	95	102	109	117	124	131	139	146	153	160	168	175	182	190
26	76	83	91	99	106	114	121	129	137	144	152	159	167	174	182	190	197
27	79	87	95	102	110	118	126	134	142	150	158	165	173	181	189	197	205
28	82	90	98	106	114	123	131	139	147	155	163	172	180	188	196	204	212
29	85	93	102	110	118	127	135	144	152	161	169	178	186	195	203	211	220
30	88	96	105	114	123	131	140	149	158	166	175	184	193	201	210	219	228

4 Inches Thick by **10** to **26** Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13	43	48	52	56	61	65	69	74	78	82	87	91	95	100	104	108	113
14	47	51	56	61	65	70	75	79	84	89	93	98	103	107	112	117	121
15	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
16	53	59	64	69	75	80	85	91	96	101	107	112	117	123	128	133	139
17	57	62	68	74	79	85	91	96	102	108	113	119	125	130	136	142	147
18	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156
19	63	70	76	82	89	95	101	108	114	120	127	133	139	146	152	158	165
20	67	73	80	87	93	100	107	113	120	127	133	140	147	153	160	167	173
21	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
22	73	81	88	95	103	110	117	125	132	139	147	154	161	169	176	183	191
23	77	84	92	100	107	115	123	130	138	146	153	161	169	176	184	192	199
24	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208
25	83	92	100	108	117	125	133	142	150	158	167	175	183	192	200	208	217
26	87	95	104	113	121	130	139	147	156	165	173	182	191	199	208	217	225
27	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234
28	93	103	112	121	131	140	149	159	168	177	187	196	205	215	224	233	243
29	97	106	116	126	135	145	155	164	174	184	193	203	213	222	232	242	251
30	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260

5 Inches Thick, by **10** to **26** Inches Wide.

L'ng ft.	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13	54	60	65	70	76	81	87	92	98	103	108	114	119	125	130	135	141
14	58	64	70	76	82	88	93	99	105	111	117	123	128	134	140	146	152
15	63	69	75	81	88	94	100	106	113	119	125	131	138	144	150	156	163
16	67	73	80	87	93	100	107	113	120	127	133	140	147	153	160	167	173
17	71	78	85	92	99	106	113	120	128	135	142	149	156	163	170	177	184
18	75	83	90	98	105	113	120	128	135	143	150	158	165	173	180	188	195
19	79	87	95	103	111	119	127	135	143	150	158	166	174	182	190	198	206
20	83	92	100	108	117	125	133	142	150	158	167	175	183	192	200	208	217
21	88	96	105	114	123	131	140	149	158	166	175	184	193	201	210	219	228
22	92	101	110	119	128	138	147	156	165	174	183	193	202	211	220	229	238
23	96	105	115	125	134	144	153	163	173	182	192	201	211	220	230	240	249
24	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
25	104	115	125	135	146	156	167	177	188	198	208	219	229	240	250	260	271
26	108	119	130	141	152	163	173	184	195	206	217	228	238	249	260	271	282
27	113	124	135	146	158	169	180	191	203	214	225	236	218	259	270	281	293
28	117	128	140	152	163	175	187	198	210	222	233	245	257	268	280	292	303
29	121	133	145	157	169	181	193	205	218	230	242	254	266	278	290	302	314
30	125	138	150	163	175	188	200	213	225	238	250	263	275	288	300	313	323

SCANTLING AND TIMBER MEASURE

REDUCED TO ONE INCH BOARD MEASURE.

Explanation. — To ascertain the number of feet of scantling or timber, say 18 feet long and 2 by 3 inches. Find 2 by 3 in the top columns, and 18 in the left hand column, and under 2 by 3 and against 18 is 9 feet.

If the scantling is longer than contained in the table, add two lengths together. If shorter, take part of some length.

[*The preceding pages also contain scantling and plank measure.*]

Thickness and Width in Inches.

Feet.	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.4	4.5
6	2.	3.	4.	5.	6.	7.	8.	9.	4.6	6.	7.6	9.	10.6	12.	13.6	8.	10.
7	2.4	3.6	4.8	5.10	7.	8.2	9.4	10.6	5.3	7.	8.9	10.6	12.3	14.	15.9	9.4	11.8
8	2.8	4.	5.4	6 8	8.	9.4	10.8	12.	6.	8.	10.	12.	14.	16.	18.	10.8	13.4
9	3.	4.6	6.	7.6	9.	10.6	12.	13.6	6.9	9.	11.3	13.6	15.9	18.	20.3	12.	15.
10	3.4	5.	6.8	8.4	10.	11.8	13.4	15.	7.6	10.	12.6	15.	17.6	20.	22.6	13.4	16.8
11	3.8	5.6	7.4	9.2	11.	12.10	14.8	16.6	8.3	11.	13.9	16.6	19.3	22.	24.9	14.8	18.4
12	4.	6.	8.	10.	12.	14.	16.	18.	9.	12.	15.	18.	21.	24.	27.	16.	20.
13	4 4	6.6	8.8	10.10	13.	15.2	17.4	19.6	9.9	13.	16.3	19.6	22.9	26.	29.3	17.4	21.8
14	4.8	7.	9.4	11.8	14.	16.4	18.8	21.	10.6	14.	17.6	21.	24.6	28.	31.6	18.8	23.4
15	5.	7.6	10.	12.6	15.	17.6	20.	22.6	11.3	15.	18.9	22.6	26.3	30.	33.9	20.	25.
16	5.4	8.	10.8	13.4	16.	18.8	21.4	24.	12.	16.	20.	24.	28.	32.	36.	21.4	26.8
17	5.8	8.6	11.4	14.2	17.	19.10	22.8	25.6	12.9	17.	21.3	25.6	29.9	34.	38.3	22.8	28.4
18	6.	9.	12.	15.	18.	21.	24.	27.	13.6	18.	22.6	27.	31.6	36.	40.6	24.	30.
19	6.4	9.6	12.8	15.10	19.	22.2	25.4	28.6	14.3	19.	23.9	28.6	33.3	38.	42.9	25.4	31.8
20	6.8	10.	13.4	16.8	20.	23.4	26.8	30.	15.	20.	25.	30.	35.	40.	45.	26.8	33.4
21	7.	10.6	14.	17.6	21.	24.6	28.	31.6	15.9	21.	26.3	31.6	36.9	42.	47.3	28.	35.
22	7.4	11.	14.8	18.4	22.	25.8	29.4	33.	16.6	22.	27.6	33.	38.6	44.	49.6	29.4	36.8
23	7.8	11.6	15.4	19.2	23.	26.10	30.8	34.6	17.3	23.	28.9	34.6	40.3	46.	51.9	30.8	38.4
24	8.	12.	16.	20.	24.	28.	32.	36.	18.	24.	30.	36.	42.	48.	54.	32.	40.
25	8.4	12.6	16.8	20.10	25.	29.2	33.4	37.6	18.9	25.	31.3	37.6	43.9	50.	56.3	33.4	41.8
30	10.	15.	20.	25.	30.	35.	40.	45.	22.6	30.	37.6	45.	52.6	60.	67.6	40.	50.
34	11.4	17.	22.8	28 4	34.	39.8	45.4	51.	25.6	34.	42.6	51.	59.6	68.	76.6	45.4	56.8
40	13.4	20.	26.8	33.4	40.	46.8	53.4	60.	30.0	40.	50.	60.	70.	80.	90.	53.4	66.8

Thickness and Width in Inches.

Feet.	4.6	4.7	4.8	4.9	5.5	5.6	5.7	5.8	5.9	6.6	6.7	6 8	6.9	6.10
6	12.	14.	16.	18.	12.6	15.	17.6	20.	22.6	18.	21.	24.	27.	30.
7	14.	16.4	18.8	21.	14.7	17.6	20.5	23.4	26.3	21.	24.6	28.	31.6	35.
8	16.	18.8	21.4	24.	16 8	20.	23.4	26.8	30.	24.	28.	32.	36.	40.
9	18.	21.	24.	27.	18.9	22.6	26.3	30.	33.9	27.	31.6	36.	40.6	45.
10	20.	23.4	26.8	30.	20.10	25.	29.2	33.4	37.6	30.	35.	40.	45.	50.
11	22.	25.8	29.4	33.	22.11	27.6	32.1	36.8	41.3	33.	38.6	44.	49.6	55.
12	24.	28.	32.	36.	25.	30.	35.	40.	45.	36.	42.	48.	54.	60.
13	26.	30.4	34.8	39.	27.1	32.6	37.11	43.4	48.9	39.	45.6	52.	58.6	65.
14	28.	32.8	37.4	42.	29.2	35.	40.10	46.8	52.6	42.	49.	56.	63.	70.
15	30.	35.	40.	45.	31.3	37.6	43.9	50.	56.3	45.	52.6	60.	67.6	75.
16	32.	37.4	42.8	48.	33.4	40.	46.8	53.4	60.	48.	56.	64.	72.	80.
17	34.	39.8	45.4	51.	35.5	42.6	49.7	56.8	63.9	51.	59.6	68.	76.6	85.
18	36.	42.	48.	54.	37.6	45.	52.6	60.	67.6	54.	63.	72.	81.	90.
19	38.	44.4	50.8	57.	39.7	47.6	55.5	63.4	71.3	57.	66.6	76.	85.6	95.
20	40.	46.8	53.4	60.	41.8	50.	58.4	66.8	75.	60.	70.	80.	90.	100.
21	42.	49.	56.	63.	43.9	52.6	61.3	70.	78.9	63.	73.6	84.	94.6	105.
22	44.	51.4	58.8	66.	45.10	55.	64.2	73.4	82.6	66.	77.	88.	99.	110.
23	46.	53.8	61.4	69.	47.11	57.6	67.1	76.8	86.3	69.	80.6	92.	103.6	115.
24	48.	56.	64.	72.	50.	60.	70.	80.	90.	72.	84.	96.	108.	120.
25	50.	58.4	66.8	75.	52.1	62.6	72.11	83.4	93.9	75.	87.6	160.	112.6	125.
30	60.	70.	80.	90.	62.6	75.	87.6	100.	112.6	90.	105.	120.	135.	150.
34	68.	79.4	90.8	102.	70.10	85.	99.2	113.4	127.6	102.	119.	136.	153.	170.
40	80.	93.4	106.8	120.	83.4	100.	116.8	133.4	150.	120.	140.	160.	180.	200.

Feet.	Thickness and Width in Inches.												
	6.11	6.12	7.7	7.8	7.9	7.10	7.11	7.12	8.8	8.9	8.10	8.11	8.12
6	33.	36.	24.6	28.	31.6	35.	38.6	42.	32.	36.	40.	44.	48.
7	38.6	42.	28.7	32.8	36.9	40.10	44.11	49.	37.4	42.	46.8	51.4	56.
8	44.	48.	32.8	37.4	42.	46.8	51.4	56.	42.8	48.	53.4	58.8	64.
9	49.6	54.	36.9	42.	47.3	52.6	57.9	63.	48.	54.	60.	66.	72.
10	55.	60.	40.10	46.8	52.6	58.4	64.2	70.	53.4	60.	66.8	73.4	80.
11	60.6	66.	44.11	51.4	57.9	64.2	70.7	77.	58.8	66.	73.4	80.8	88.
12	66.	72.	49.	56.	63.	70.	77.	84.	64.	72.	80.	88.	96.
13	71.6	78.	53.1	60.8	68.3	75.10	83.5	91.	69.4	78.	86.8	95.4	104.
14	77.	84.	57.2	65.4	73.6	81.8	89.10	98.	74.8	84.	93.4	102.8	112.
15	82.6	90.	61.3	70.	78.9	87.6	96.3	105.	80.	90.	100.	110.	120.
16	88.	96.	65.4	74.8	84.	93.4	102.8	112.	85.4	96.	106.8	117.4	128.
17	93.6	102.	69.5	79.4	89.3	99.2	109.1	119.	90.8	102.	113.4	124.8	136.
18	99.	108.	73.6	84.	94.6	105.	115.6	126.	96.	108.	120.	132.	144.
19	104.6	114.	77.7	88.8	99.9	110.10	121.11	133.	101.4	114.	126.8	139.4	152.
20	110.	120.	81.8	93.4	105.	116.8	128.4	140.	106.8	120.	133.4	146.8	160.
21	115.6	126.	85.9	98.	110.3	122.6	134.9	147.	112.	126.	140.	154.	168.
22	121.	132.	89.10	102.8	115.6	128.4	141.2	154.	117.4	132.	146.8	161.4	176.
23	126.6	138.	93.11	107.4	120.9	134.2	147.7	161.	122.8	138.	153.4	168.8	184.
24	132.	144.	98.	112.	126.	140.	154.	168.	128.	144.	160.	176.	192.

Feet.	Thickness and Width in Inches.												
	9.9	9.10	9.11	9.12	10.10	10.11	10.12	11.11	11.12	12.12	12.13	12.14	
6	40.6	45.	49.6	54.	50.	55.	60.	60.6	66.	72.	78.	84.	
7	47.3	52.6	57.9	63.	58.4	64.2	70.	70.7	77.	84.	91.	98.	
8	54.	60.	66.	72.	66.8	73.4	80.	80.8	88.	96.	104.	112.	
9	60.9	67.6	74.3	81.	75.	82.6	90.	90.9	99.	108.	117.	126.	
10	67.6	75.	82.6	90.	83.4	91.8	100.	100.10	110.	120.	130.	140.	
11	74.3	82.6	90.9	99.	91.8	100.10	110.	110.11	121.	132.	143.	154.	
12	81.	90.	99.	108.	100.	110.	120.	121.	132.	144.	156.	168.	
13	87.9	97.6	107.3	117.	108.4	119.2	130.	131.1	143.	156.	169.	182.	
14	94.6	105.	115.6	126.	116.8	128.4	140.	141.2	154.	168.	182.	196.	
15	191.3	112.6	123.9	135.	125.	137.6	150.	151.3	165.	180.	195.	210.	
16	108.	120.	132.	144.	133.4	146.8	160.	161.4	176.	192.	208.	224.	
17	114.9	127.6	140.3	153.	141.8	155.10	170.	171.5	187.	204.	221.	238.	
18	121.6	135.	148.6	162.	150.	165.	180.	181.6	198.	216.	234.	252.	
19	128.3	142.6	156.9	171.	158.4	174.2	190.	191.7	209.	228.	247.	266.	
20	135.	150.	165.	180.	166.8	183.4	200.	201.8	220.	240.	260.	280.	
21	141.9	157.6	173.3	189.	175.	192.6	210.	211.9	231.	252.	273.	294.	
22	148.6	165.	181.6	198.	183.4	201.8	220.	221.10	242.	264.	286.	308.	
23	155.3	172.6	189.9	207.	191.8	210.10	230.	231.11	253.	276.	299.	322.	
24	162.	180.	198.	216.	200.	220.	240.	242.	264.	288.	312.	336.	

Feet.	Thickness and Width in Inches.										
	12.15	12.16	13.13	13.14	13.15	13.16	14.14	14.15	14.16	15.15	15.16
6	90.	96.	84.6	91.	97.6	104.	98.	105.	112.	112.6	120.
7	105.	112.	98.7	106.2	113.9	121.4	114.4	122.6	130.8	131.3	140.
8	120.	128.	112.8	121.4	130.	138.8	130.8	140.	149.4	150.	160.
9	135.	144.	126.9	136.6	146.3	156.	147.	157.6	168.	168.9	180.
10	150.	160.	140.10	151.8	162.6	173.4	163.4	175.	186.8	187.6	200.
11	165.	176.	154.11	166.10	178.9	190.8	179.8	192.6	205.4	206.3	220.
12	180.	192.	169.	182.	195.	208.	196.	210.	224.	225.	240.
13	195.	208.	183.1	197.2	211.3	225.4	212.4	227.6	242.8	243.9	260.
14	210.	224.	197.2	212.4	227.6	242.8	228.8	245.	261.4	262.6	280.
15	225.	240.	211.3	227.6	243.9	260.	245.	262.6	280.	281.3	300.
16	240.	256.	225.4	242.8	260.	277.4	261.4	280.	298.8	300.	320.
17	255.	272.	239.5	257.10	276.3	294.8	277.8	297.6	317.4	318.9	340.
18	270.	288.	243.6	273.	292.6	312.	290.	314.	336.	337.6	360.
19	285.	304.	257.7	288.2	308.9	329.4	310.4	332.6	354.8	356.3	380.
20	300.	320.	271.8	303.4	325.	346.8	326.8	350.	373.4	375.	400.
21	315.	336.	285.9	318.6	341.3	364.	343.	367.6	392.	393.9	420.
22	330.	352.	299.10	333.8	357.6	381.4	359.4	385.	410.8	412.6	440.
23	345.	368.	313.11	348.10	373.9	398.8	375.8	402.6	429.4	431.3	460.
24	360.	384.	338.	364.	390.	416.	392.	420.	448.	450.	480.

BOARD AND PLANK MEASUREMENT—AT SIGHT.

This Table gives the square feet and inches in boards from 6 to 25 inches wide, and from 8 to 36 feet long. If a board be longer than 36 feet, unite two numbers. For instance, if a board is 40 feet long and 16 inches wide, add 30 and 10 and you have 53 feet 4 inches. For 2 inch plank, double the *product*. See also Board Table, page 118.

Feet long.	6 in W.		7 in W.		8 in W.		9 in W.		10 in W.		11 in W.		12 in W.		13 in W.		14 in W.		15 in W.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
8	4	0	4	8	5	4	6	0	6	8	7	4	8	0	8	8	9	4	10	0
9	4	6	5	3	6	0	6	9	7	6	8	3	9	0	9	9	10	6	11	3
10	5	0	5	10	6	8	7	6	8	4	9	2	10	0	10	10	11	8	12	6
11	5	6	6	5	7	4	8	3	9	2	10	1	11	0	11	11	12	10	13	9
12	6	0	7	0	8	0	9	0	10	0	11	0	12	0	13	6	14	0	15	0
13	6	6	7	7	8	8	9	9	10	10	11	11	13	0	14	1	15	2	16	3
14	7	0	8	2	9	4	10	6	11	8	12	10	14	0	15	2	16	4	17	6
15	7	6	8	9	10	0	11	3	12	6	13	9	15	0	16	3	17	6	18	9
16	8	0	9	4	10	8	12	0	13	4	14	8	16	0	17	4	18	8	20	0
17	8	6	9	11	11	4	12	9	14	2	15	7	17	0	18	5	19	10	21	3
18	9	0	10	6	12	0	13	6	15	0	16	6	18	0	19	6	21	0	22	6
19	9	6	11	1	12	8	14	3	15	10	17	5	19	0	20	7	22	2	23	9
20	10	0	11	8	13	4	15	0	16	8	18	4	20	0	21	8	23	4	25	0
21	10	6	12	3	14	0	15	9	17	6	19	3	21	0	22	9	24	6	26	3
22	11	0	12	10	14	8	16	6	18	4	20	2	22	0	23	10	25	8	27	6
23	11	6	13	5	15	4	17	3	19	2	21	1	23	0	24	11	26	10	28	9
24	12	0	14	0	16	0	18	0	20	0	22	0	24	0	26	0	28	0	30	0
25	12	6	14	7	16	8	18	9	20	10	22	11	25	0	27	1	29	2	31	3
26	13	0	15	2	17	4	19	6	21	8	23	10	26	0	28	2	30	4	32	6
27	13	6	15	9	18	0	20	3	22	6	24	9	27	0	29	3	31	6	33	9
28	14	0	16	4	18	8	21	0	23	4	25	8	28	0	30	4	32	8	35	0
29	14	6	16	11	19	4	21	9	24	2	26	7	29	0	31	5	33	10	36	3
30	15	0	17	6	20	0	22	6	25	0	27	6	30	0	32	6	35	0	37	6
31	15	6	18	1	20	8	23	3	25	10	28	5	31	0	33	7	36	2	38	9
32	16	0	18	8	21	4	24	0	26	8	29	4	32	0	34	8	37	4	40	0
33	16	6	19	3	22	0	24	9	27	6	30	3	33	0	35	9	38	6	41	3
34	17	0	19	10	22	8	25	6	28	4	31	2	34	0	36	10	39	8	42	6
35	17	6	20	5	23	4	26	3	29	2	32	1	35	0	37	11	40	10	43	9
36	18	0	21	0	24	0	27	0	30	0	33	0	36	0	39	0	42	0	45	0

BOARD TABLE MEASUREMENT—CONTINUED.

Feet long.	16 in W.		17 in W.		18 in W.		19 in W.		20 in W.		21 in W.		22 in W.		23 in W.		24 in W.		25 in W.	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in	ft.	in.
8	10	8	11	4	12	0	12	8	13	4	14	0	14	8	15	4	16	0	16	8
9	12	0	12	9	13	6	14	3	15	0	15	9	16	6	17	3	18	0	18	9
10	13	4	14	2	15	0	15	10	16	8	17	6	18	4	19	2	20	0	20	10
11	14	8	15	7	16	6	17	5	18	4	19	3	20	2	21	1	22	0	22	11
12	16	0	17	0	18	0	19	0	20	0	21	0	22	0	23	0	24	0	25	0
13	17	1	18	5	19	6	20	7	21	8	22	9	23	10	24	11	26	0	27	1
14	18	8	19	10	21	0	22	2	23	4	24	6	25	8	26	10	28	0	29	2
15	20	0	21	3	22	6	23	9	25	0	26	3	27	6	28	9	30	0	31	3
16	21	4	22	8	24	0	25	4	26	8	28	0	29	4	30	8	32	0	33	4
17	22	8	24	1	25	6	26	11	28	4	29	9	31	2	32	7	34	0	35	5
18	24	0	25	6	27	0	28	6	30	0	31	6	33	0	34	6	36	0	37	6
19	25	4	26	11	28	6	30	1	31	8	33	3	34	10	36	5	38	0	39	7
20	26	8	28	4	30	0	31	8	33	4	35	0	36	8	38	4	40	0	41	8
21	28	0	29	9	31	6	33	3	35	0	36	9	38	6	40	3	42	0	43	9
22	29	4	31	2	33	0	34	10	36	8	38	6	40	4	42	2	44	0	45	10
23	30	8	32	7	34	6	36	5	38	4	40	3	42	2	44	1	46	0	47	11
24	32	0	34	0	36	0	38	0	40	0	42	0	44	0	46	0	48	0	50	0
25	33	4	35	5	37	6	39	7	41	8	43	9	45	10	47	11	50	0	52	1
26	34	8	36	10	39	0	41	2	43	4	45	6	47	8	49	10	52	0	54	2
27	36	0	38	3	40	6	42	9	45	0	47	3	49	6	51	9	54	0	56	3
28	37	4	39	8	12	0	44	4	46	8	49	0	51	4	53	8	56	0	58	4
29	38	8	41	1	43	6	45	11	48	4	50	9	53	2	55	7	58	0	60	5
30	40	0	42	6	45	0	47	6	50	0	52	6	55	0	57	6	60	0	62	6

LOGS REDUCED TO ONE INCH BOARD MEASURE.

Rule. — The number of feet is obtained by subtracting *one quarter* from the *diameter* of the log. *Example.* — If a log is 12 feet long, and 12 inches diameter, deducting one quarter from the diameter, leaves 9 inches, making 9 boards 9 inches wide, each board measuring 9 feet. Now multiply the number of boards by the number of feet in one board, and the product will be 81 feet.

The diameter of all timber is to be taken 20 feet from the butt. All logs short of 20 feet, take the diameter at the top or small end. If the log is longer than is contained in the table, take any two lengths.

The first column on the left gives the length of the log in feet. The figures under D denote the diameters of the logs in inches.

Lgth feet.	D. 10	D. 11	D. 12	D. 13	D. 14	D. 15	D. 16	D. 17	D. 18	D. 19	D. 20	D. 21	D. 22	D. 23	D. 24
10	47	57	68	79	92	105	120	135	152	169	188	207	227	248	270
11	52	62	74	87	101	116	132	149	167	186	206	227	250	273	297
12	56	68	81	95	110	127	144	163	182	203	225	248	272	298	324
13	61	74	88	103	119	137	156	176	197	220	244	269	295	322	351
14	66	79	95	111	129	148	168	190	213	237	263	289	318	347	378
15	70	85	101	119	138	158	180	203	228	254	281	310	340	372	405
16	75	91	108	127	147	169	192	217	243	271	300	331	363	397	432
17	80	96	115	135	156	179	204	230	258	288	319	351	386	422	459
18	84	102	122	143	165	190	216	244	273	305	338	372	408	446	486
19	89	108	128	150	175	209	228	257	289	322	356	393	431	471	513
20	94	113	135	158	184	211	240	271	304	338	375	413	454	496	540
21	98	119	142	166	193	221	252	284	319	355	394	434	476	521	567
22	103	125	149	174	202	232	264	298	334	372	413	455	499	546	594
23	108	130	155	182	211	243	276	312	349	389	431	475	522	570	621
24	113	136	162	190	220	253	288	325	364	406	450	496	544	595	648
25	117	142	169	198	230	264	300	339	380	423	469	517	567	620	675
26	122	147	176	206	239	274	312	352	395	440	488	537	590	645	702
27	127	153	182	214	248	285	324	366	410	457	506	558	613	670	729
28	131	159	139	222	257	295	336	379	425	474	525	579	635	694	756
29	136	164	196	230	266	306	348	393	440	491	514	599	658	719	783
30	141	170	203	238	276	316	360	406	456	508	563	620	681	744	810
31	145	176	209	246	285	327	372	420	471	525	581	641	703	769	837
35	164	193	236	277	322	369	420	474	532	592	656	724	794	868	945

Lgth feet.	D. 25	D. 26	D. 27	D. 28	D. 29	D. 30	D. 31	D. 32	D. 33	D. 34	D. 35	D. 36
10	293	317	342	368	394	422	450	480	510	542	574	608
11	322	349	376	404	434	464	496	528	562	596	632	668
12	352	380	410	441	473	506	541	576	613	650	689	729
13	381	412	444	478	512	548	586	624	664	704	746	790
14	410	444	478	515	552	591	631	672	715	759	804	851
15	439	475	513	551	591	633	676	720	766	813	861	911
16	469	507	547	588	631	675	721	768	817	867	919	972
17	498	539	581	625	670	717	766	816	868	921	976	1033
18	527	570	615	662	710	759	811	864	919	975	1034	1094
19	557	602	649	698	749	802	856	912	970	1030	1091	1154
20	586	634	683	735	788	844	901	960	1021	1084	1148	1215
21	615	665	718	772	828	886	946	1008	1072	1138	1206	1276
22	645	697	752	809	867	928	991	1056	1123	1192	1263	1337
23	674	729	786	845	907	970	1036	1104	1174	1246	1321	1397
24	703	761	820	882	946	1012	1081	1152	1225	1300	1378	1458
25	732	792	854	919	986	1055	1126	1200	1276	1355	1436	1519
26	762	824	888	956	1025	1097	1171	1218	1327	1409	1493	1580
27	791	856	923	992	1064	1139	1216	1296	1378	1463	1550	1640
28	820	887	957	1029	1104	1181	1261	1314	1429	1517	1608	1701
29	850	919	991	1066	1143	1223	1306	1392	1480	1571	1665	1762
30	879	951	1025	1103	1183	1266	1351	1440	1531	1626	1723	1828
31	908	982	1059	1139	1222	1308	1396	1488	1582	1680	1780	1883
35	1025	1109	1196	1286	1380	1477	1577	1680	1787	1897	2010	2126

SOLID CONTENTS OF EQUAL SIDED TIMBER.

If the log is shorter than is contained in the table, take half or quarter of some length, if longer double some length. The length of the log is given on the top of the columns, the diameter in the left hand column. To obtain the cubical contents of masts, spars, round logs, &c., subtract one fourth from the contents.

D.	L. 9	L. 10	L. 11	L. 12	L. 13	L. 14	L. 15	L. 16	L. 17	L. 18	L. 19	L. 20
6	2 3	2 6	2 9	3 0	3 3	3 6	3 9	4 0	4 3	4 6	4 9	5 0
7	3 0	3 4	3 7	4 1	4 5	4 9	5 1	5 5	5 9	6 2	6 6	6 10
8	4 1	4 4	4 10	5 4	5 9	6 2	6 7	8 0	8 5	8 10	9 3	9 8
9	5 2	5 9	6 2	6 9	7 4	7 11	8 6	9 1	9 8	10 3	10 10	11 5
10	6 2	6 10	7 8	8 4	9 0	9 8	10 4	11 0	11 8	12 4	13 0	13 8
11	7 6	8 4	9 3	10 1	10 11	11 9	12 7	13 5	14 3	15 1	15 11	16 9
12	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0
13	10 4	11 7	12 10	14 1	15 3	16 5	17 9	18 9	19 11	21 1	22 3	23 5
14	12 2	13 7	14 11	16 4	17 8	18 11	20 3	21 7	22 11	24 3	25 7	26 11
15	14 2	15 9	17 2	18 9	20 4	21 10	23 5	25 0	26 7	28 2	29 9	31 4
16	16 0	17 10	19 6	21 4	23 1	24 10	26 7	28 4	30 1	31 10	33 7	35 4
17	18 0	20 0	22 0	24 1	26 1	28 1	30 1	32 1	34 1	36 1	38 1	40 1
18	20 3	22 6	24 9	27 0	29 3	31 6	33 9	36 0	38 3	40 6	42 9	45 0
19	22 6	25 0	27 6	30 1	32 7	35 1	37 7	41 1	43 7	46 1	48 7	52 0
20	25 0	27 10	30 10	33 4	36 1	38 10	41 7	44 4	47 2	50 0	52 9	55 9
21	27 7	30 8	33 9	36 9	39 10	42 11	46 0	49 1	52 2	55 3	58 4	61 5
22	30 2	33 6	36 10	40 4	43 8	47 0	50 4	53 8	57 0	60 4	63 8	67 0
23	33 0	36 8	40 4	44 1	47 9	51 5	55 1	58 9	62 5	66 1	69 9	73 5
24	36 0	40 0	44 0	48 0	52 0	56 0	60 0	64 0	68 0	72 0	76 0	80 0
25	39 0	43 4	48 1	52 1	56 5	60 9	65 1	69 5	73 9	78 1	82 5	86 9
26	42 2	46 11	51 7	56 4	61 0	65 8	70 4	75 0	79 8	84 4	89 0	93 8
27	45 7	50 8	55 9	60 9	65 10	70 11	76 0	81 1	86 2	91 7	96 8	101 11
28	49 0	54 5	59 10	65 4	70 9	76 2	81 7	85 0	92 5	97 10	103 3	108 8
29	52 6	58 4	64 2	70 1	75 11	81 9	87 7	93 5	99 3	106 1	112 11	117 9
30	55 9	62 0	68 3	75 0	81 3	87 6	93 9	100 0	106 3	112 6	118 9	125 0

Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.
1 in.	.7854	5 in.	19.635	9 in.	63.617	13 in.	132 732	17 in.	226.980	21 in.	346.361
⅛	.9940	⅛	20.629	⅛	65.396	⅛	135.297	⅛	230.330	⅛	350.497
¼	1.2271	¼	21.647	¼	67.200	¼	137.886	¼	233.705	¼	354.657
⅜	1.4848	⅜	22.690	⅜	69.029	⅜	140.500	⅜	237.104	⅜	358.841
½	1.7671	½	23.758	½	70.882	½	143.139	½	240.528	½	363.051
⅝	2.0739	⅝	24.850	⅝	72.759	⅝	145.802	⅝	243.977	⅝	367.284
¾	2.4052	¾	25.967	¾	74.662	¾	148.489	¾	247.450	¾	371.543
⅞	2.7611	⅞	27.108	⅞	76.588	⅞	151.201	⅞	250.947	⅞	375.826
2 in.	3.1416	6 in.	28.274	10 in.	78.540	14 in.	153.938	18 in.	254.469	22 in.	380.133
⅛	3.5465	⅛	29.464	⅛	80.515	⅛	156.699	⅛	258.016	⅛	384.465
¼	3.9760	¼	30.679	¼	82.516	¼	159.485	¼	261.587	¼	388.822
⅜	4.4302	⅜	31.919	⅜	84.540	⅜	162.295	⅜	265.182	⅜	393.203
½	4.9087	½	33.183	½	86.590	½	165.130	½	268.803	½	397.608
⅝	5.4119	⅝	34.471	⅝	88.664	⅝	167.989	⅝	272.447	⅝	402.038
¾	5.9395	¾	35.784	¾	90.762	¾	170.873	¾	276.117	¾	406.493
⅞	6.4918	⅞	37.122	⅞	92.885	⅞	173.782	⅞	279.811	⅞	410.972
3 in.	7.0686	7 in.	38.484	11 in.	95.033	15 in.	176.715	19 in.	283.529	23 in.	415.476
⅛	7.6699	⅛	39.871	⅛	97.205	⅛	179.672	⅛	287.272	⅛	420.004
¼	8.2957	¼	41.282	¼	99.402	¼	182.654	¼	291.039	¼	424.557
⅜	8.9462	⅜	42.718	⅜	101.623	⅜	185.661	⅜	294.831	⅜	429.135
½	9.6211	½	44.178	½	103.869	½	188.692	½	298.648	½	433.731
⅝	10.320	⅝	45.663	⅝	106.139	⅝	191.748	⅝	302.489	⅝	438.363
¾	11.044	¾	47.173	¾	108.434	¾	194.828	¾	306.355	¾	443.014
⅞	11.793	⅞	48.707	⅞	110.753	⅞	197.933	⅞	310.245	⅞	447.699
4 in.	12.566	8 in.	50.265	12 in.	113.097	16 in.	201.062	20 in.	314.160	24 in.	452.390
⅛	13.364	⅛	51.848	⅛	115.466	⅛	204.216	⅛	318.099	⅛	457.115
¼	14.186	¼	53.456	¼	117.859	¼	207.394	¼	322.063	¼	461.864
⅜	15.033	⅜	55.088	⅜	120.276	⅜	210.597	⅜	326.051	⅜	466.638
½	15.904	½	56.745	½	122.718	½	213.825	½	330.064	½	471.436
⅝	16.800	⅝	58.426	⅝	125.184	⅝	217.077	⅝	334.101	⅝	476.259
¾	17.720	¾	60.132	¾	127.676	¾	220.353	¾	338.163	¾	481.106
⅞	18.665	⅞	61.862	⅞	130.192	⅞	223.654	⅞	342.250	⅞	485.978
29 in.	660.521	29⅛	666.227	29¼	671.958	29⅜	677.714	29½	683.494	29¾	95.128

TABLES to find the cost of any number of pounds, yards, pieces, or bushels, from 2 cents to $3. The first column contains the number, the top columns the prices.

Nos.	2 ct.	3 ct.	4 ct.	5 ct.	6 ct.	6¼ ct.	7 ct.	8 ct.	9 ct.	10 ct.	11 ct.	12 ct.	12½ ct.	13 ct.	14 ct.
2	.4	.6	.8	.10	.12	.12½	.14	.16	.18	.20	.22	.24	.25	.26	.28
3	.6	.9	.12	.15	.18	.18¾	.21	.24	.27	.30	.33	.36	.37½	.39	.42
4	.8	.12	.16	.20	.24	.25	.28	.32	.36	.40	.44	.48	.50	.52	.56
5	.10	.15	.20	.25	.30	.31¼	.35	.40	.45	.50	.55	.60	.62½	.65	.70
6	.12	.18	.24	.30	.36	.37½	.42	.48	.54	.60	.66	.72	.75	.78	.84
7	.14	.21	.28	.35	.42	.43¾	.49	.56	.63	.70	.77	.84	.87½	.91	.98
8	.16	.24	.32	.40	.48	.50	.56	.64	.72	.80	.88	.96	1.00	1.04	1.12
9	.18	.27	.36	.45	.54	.56¼	.63	.72	.81	.90	.99	1.08	1.12½	1.17	1.26
10	.20	.30	.40	.50	.60	.62½	.70	.80	.90	1.00	1.10	1.20	1.25	1.30	1.40
11	.22	.33	.44	.55	.66	.68¾	.77	.88	.99	1.10	1.21	1.32	1.37½	1.43	1.54
12	.24	.36	.48	.60	.72	.75	.84	.96	1.08	1.20	1.32	1.44	1.50	1.56	1.68
13	.26	.39	.52	.65	.78	.81¼	.91	1.04	1.17	1.30	1.43	1.56	1.62½	1.69	1.82
14	.28	.42	.56	.70	.84	.87½	.98	1.12	1.26	1.40	1.54	1.68	1.75	1.82	1.96
15	.30	.45	.60	.75	.90	.93¾	1.05	1.20	1.35	1.50	1.65	1.80	1.87½	1.95	2.10
16	.32	.48	.64	.80	.96	1.00	1.12	1.28	1.44	1.60	1.76	1.92	2.00	2.08	2.24
17	.34	.51	.68	.85	1.02	1.06¼	1.19	1.36	1.53	1.70	1.87	2.04	2.12½	2.21	2.38
18	.36	.54	.72	.90	1.08	1.12½	1.26	1.44	1.62	1.80	1.98	2.16	2.25	2.34	2.52
19	.38	.57	.76	.95	1.14	1.18¾	1.33	1.52	1.71	1.90	2.09	2.28	2.37½	2.47	2.66
20	.40	.60	.80	1.00	1.20	1.25	1.40	1.60	1.80	2.00	2.20	2.40	2.50	2.60	2.80
21	.42	.63	.84	1.05	1.26	1.31¼	1.47	1.68	1.89	2.10	2.31	2.52	2.62½	2.73	2.94
22	.44	.66	.88	1.10	1.32	1.37½	1.54	1.76	1.98	2.20	2.42	2.64	2.75	2.86	3.08
23	.46	.69	.92	1.15	1.38	1.43¾	1.61	1.84	2.07	2.30	2.53	2.76	2.87½	2.99	3.22
24	.48	.72	.96	1.20	1.44	1.50	1.68	1.92	2.16	2.40	2.64	2.88	3.00	3.12	3.36
25	.50	.75	1.00	1.25	1.50	1.56¼	1.75	2.00	2.25	2.50	2.75	3.00	3.12½	3.25	3.50
30	.60	.90	1.20	1.50	1.80	1.87½	2.10	2.40	2.70	3.00	3.30	3.60	3.75	3.90	4.20
40	.80	1.20	1.60	2.00	2.40	2.50	2.80	3.20	3.60	4.00	4.40	4.80	5.00	5.20	5.60
50	1.00	1.50	2.00	2.50	3.00	3.12½	3.50	4.00	4.50	5.00	5.50	6.00	6.25	6.50	7.00
60	1.20	1.80	2.40	3.00	3.60	3.75	4.20	4.80	5.40	6.00	6.60	7.20	7.50	7.80	8.40
70	1.40	2.10	2.80	3.50	4.20	4.37½	4.90	5.60	6.30	7.00	7.70	8.40	8.75	9.10	9.80
80	1.60	2.40	3.20	4.00	4.80	5.00	5.60	6.40	7.20	8.00	8.80	9.60	10.00	10.40	11.20
90	1.80	2.70	3.60	4.50	5.40	5.62½	6.30	7.20	8.10	9.00	9.90	10.80	11.25	11.70	12.60
100	2.00	3.00	4.00	5.00	6.00	6.25	7.00	8.00	9.00	10.00	11.00	12.00	12.50	13.00	14.00

Nos.	15 ct.	16 ct.	17 ct.	18 ct.	18¾ ct.	19 ct.	20 ct.	21 ct.	22 ct.	23 ct.	24 ct.	25 ct.	26 ct.	27 ct.
2	.30	.32	.34	.36	.37½	.38	.40	.42	.44	.46	.48	.50	.52	.54
3	.45	.48	.51	.54	.56¼	.57	.60	.63	.66	.69	.72	.75	.78	.81
4	.60	.64	.68	.72	.75	.76	.80	.84	.88	.92	.96	1.00	1.04	1.08
5	.75	.80	.85	.90	.93¾	.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35
6	.90	.96	1.02	1.08	1.12½	1.14	1.20	1.26	1.32	1.38	1.44	1.50	1.56	1.62
7	1.05	1.12	1.19	1.26	1.31¼	1.33	1.40	1.47	1.54	1.61	1.68	1.75	1.82	1.89
8	1.20	1.28	1.36	1.44	1.50	1.52	1.60	1.68	1.76	1.84	1.92	2.00	2.08	2.16
9	1.35	1.44	1.53	1.62	1.68¾	1.71	1.80	1.89	1.98	2.07	2.16	2.25	2.34	2.43
10	1.50	1.60	1.70	1.80	1.87½	1.90	2.00	2.10	2.20	2.30	2.40	2.50	2.60	2.70
11	1.65	1.76	1.87	1.98	2.06¼	2.09	2.20	2.31	2.42	2.53	2.64	2.75	2.86	2.97
12	1.80	1.92	2.04	2.16	2.25	2.28	2.40	2.52	2.64	2.76	2.88	3.00	3.12	3.24
13	1.95	2.08	2.21	2.34	2.43¾	2.47	2.60	2.73	2.86	2.99	3.12	3.25	3.38	3.51
14	2.10	2.24	2.38	2.52	2.62½	2.66	2.80	2.94	3.08	3.22	3.36	3.50	3.64	3.78
15	2.25	2.40	2.55	2.70	2.81¼	2.85	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05
16	2.40	2.56	2.72	2.88	3.00	3.04	3.20	3.36	3.52	3.68	3.84	4.00	4.16	4.32
17	2.55	2.72	2.89	3.06	3.18¾	3.23	3.40	3.57	3.74	3.91	4.08	4.25	4.42	4.59
18	2.70	2.88	3.06	3.24	3.37½	3.42	3.60	3.78	3.96	4.14	4.32	4.50	4.68	4.86
19	2.85	3.04	3.23	3.42	3.56¼	3.61	3.80	3.99	4.18	4.37	4.56	4.75	4.94	5.13
20	3.00	3.20	3.40	3.60	3.75	3.80	4.00	4.20	4.40	4.60	4.80	5.00	5.20	5.40
21	3.15	3.36	3.57	3.78	3.93¾	3.99	4.20	4.41	4.62	4.83	5.04	5.25	5.46	5.67
22	3.30	3.52	3.74	3.96	4.12½	4.18	4.40	4.62	4.84	5.06	5.28	5.50	5.72	5.94
23	3.45	3.68	3.91	4.14	4.31¼	4.37	4.60	4.83	5.06	5.29	5.52	5.75	5.98	6.21
24	3.60	3.84	4.08	4.32	4.50	4.56	4.80	5.04	5.28	5.52	5.76	6.00	6.24	6.48
25	3.75	4.00	4.25	4.50	4.68¾	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75
30	4.50	4.80	5.1	5.40	5.62½	5.70	6.00	6.30	6.60	6.90	7.20	7.50	7.80	8.10
40	6.00	6.40	6.80	7.20	7.50	7.60	8.00	8.40	8.80	9.20	9.60	10.00	10.40	10.80
50	7.50	8.00	8.50	9.00	9.37½	9.50	10.00	10.50	11.00	11.50	12.00	12.50	13.00	13.50
60	9.00	9.60	10.20	10.80	11.25	11.40	12.00	12.60	13.20	13.80	14.40	15.00	15.60	16.20
70	10.50	11.20	11.90	12.60	13.12½	13.30	14.00	14.70	15.40	16.10	16.80	17.50	18.20	18.90
80	12.00	12.80	13.60	14.40	15.00	15.20	16.00	16.80	17.60	18.40	19.20	20.00	20.80	21.60
90	13.50	14.40	15.30	16.20	16.87½	17.10	18.00	18.90	19.80	20.70	21.60	22.50	23.40	24.30
100	15.00	16.00	17.00	18.00	18.75	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00

If the number required is not found in the tables, add two numbers together. For instance, if 35 bushels are required, add the prices opposite 30 and 5 together; and so for 365 bushels, treble the value of 100, and add 60 and 5 together.

Nos.	28 ct.	29 ct.	30 ct.	31 ct.	31¼ ct.	32 ct.	33 ct.	33⅓ ct.	34 ct.	35 ct.	36 ct.	37 ct.	37½ ct.
2	.56	.58	.60	.62	.62½	.64	.66	.66⅔	.68	.70	.72	.74	.75
3	.84	.87	.90	.93	.93¾	.96	.99	1.00	1.02	1.05	1.08	1.11	1.12½
4	1.12	1.16	1.20	1.24	1.25	1.28	1.32	1.33⅓	1.36	1.40	1.44	1.48	1.50
5	1.40	1.45	1.50	1.55	1.56¼	1.60	1.65	1.66⅔	1.70	1.75	1.80	1.85	1.87½
6	1.68	1.74	1.80	1.86	1.87½	1.92	1.98	2.00	2.04	2.10	2.16	2.22	2.25
7	1.96	2.03	2.10	2.17	2.18¾	2.24	2.31	2.33⅓	2.38	2.45	2.52	2.59	2.62½
8	2.24	2.32	2.40	2.48	2.50	2.56	2.64	2.66⅔	2.72	2.80	2.88	2.96	3.00
9	2.52	2.61	2.70	2.79	2.81¼	2.88	2.97	3.00	3.06	3.15	3.24	3.33	3.37½
10	2.80	2.90	3.00	3.10	3.12½	3.20	3.30	3.33⅓	3.40	3.50	3.60	3.70	3.75
11	3.08	3.19	3.30	3.41	3.43¾	3.52	3.63	3.66⅔	3.74	3.85	3.96	4.07	4.12½
12	3.36	3.48	3.60	3.72	3.75	3.84	3.96	4.00	4.08	4.20	4.32	4.44	4.50
13	3.64	3.77	3.90	4.03	4.06¼	4.16	4.29	4.33⅓	4.42	4.55	4.68	4.81	4.87½
14	3.92	4.06	4.20	4.34	4.37½	4.48	4.62	4.66⅔	4.76	4.90	5.04	5.18	5.25
15	4.20	4.35	4.50	4.65	4.68¾	4.80	4.95	5.00	5.10	5.25	5.40	5.55	5.62½
16	4.48	4.64	4.80	4.96	5.00	5.12	5.28	5.33⅓	5.44	5.60	5.76	5.92	6.00
17	4.76	4.93	5.10	5.27	5.31¼	5.44	5.61	5.66⅔	5.78	5.95	6.12	6.29	6.37½
18	5.04	5.22	5.40	5.58	5.62½	5.76	5.94	6.00	6.12	6.30	6.48	6.66	6.75
19	5.32	5.51	5.70	5.89	5.93¾	6.08	6.27	6.33⅓	6.46	6.65	6.84	7.03	7.12½
20	5.60	5.80	6.00	6.20	6.25	6.40	6.60	6.66⅔	6.80	7.00	7.20	7.40	7.50
21	5.88	6.09	6.30	6.51	6.56¼	6.72	6.93	7.00	7.14	7.35	7.56	7.77	7.87½
22	6.16	6.38	6.60	6.82	6.87½	7.04	7.26	7.33⅓	7.48	7.70	7.92	8.14	8.25
23	6.44	6.67	6.90	7.13	7.18¾	7.36	7.59	7.66⅔	7.82	8.05	8.28	8.51	8.62½
24	6.72	6.96	7.20	7.44	7.50	7.68	7.92	8.00	8.16	8.40	8.64	8.88	9.00
25	7.00	7.25	7.50	7.75	7.81¼	8.00	8.25	8.33⅓	8.50	8.75	9.00	9.25	9.37½
30	8.40	8.70	9.00	9.30	9.37½	9.60	9.90	10.00	10.20	10.50	10.80	11.10	11.25
40	11.20	11.60	12.00	12.40	12.50	12.80	13.20	13.33⅓	13.60	14.00	14.40	14.80	15.00
50	14.00	14.50	15.00	15.50	15.62½	16.00	16.50	16.66⅔	17.00	17.50	18.00	18.50	18.75
60	16.80	17.40	18.00	18.60	18.75	19.20	19.80	20.00	20.40	21.00	21.60	22.20	22.50
70	19.60	20.30	21.00	21.70	21.87½	22.40	23.10	23.33⅓	23.80	24.50	25.20	25.90	26.25
80	22.40	23.20	24.00	24.80	25.00	25.60	26.40	26.66⅔	27.20	28.00	28.80	29.60	30.00
90	25.20	26.10	27.00	27.90	28.12½	28.80	29.70	30.00	30.60	31.50	32.40	33.30	33.75
100	28.00	29.00	30.00	31.00	31.25	32.00	33.00	33.33⅓	34.00	35.00	36.00	37.00	37.50

Nos.	38 ct.	39 ct.	40 ct.	41 ct.	42 ct.	43 ct.	44 ct.	45 ct.	46 ct.	47 ct.	48 ct.	49 ct.	50 ct.	51 ct.
2	.76	.78	.80	.82	.84	.86	.88	.90	.92	.94	.96	.98	1.00	1.02
3	1.14	1.17	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.53
4	1.52	1.56	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.00	2.04
5	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55
6	2.28	2.34	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	2.94	3.00	3.06
7	2.66	2.73	2.80	2.87	2.94	3.01	3.08	3.15	3.22	3.29	3.36	3.43	3.50	3.57
8	3.04	3.12	3.20	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.00	4.08
9	3.42	3.51	3.60	3.69	3.78	3.87	3.96	4.05	4.14	4.23	4.32	4.41	4.50	4.59
10	3.80	3.90	4.00	4.10	4.20	4.30	4.40	4.50	4.60	4.70	4.80	4.90	5.00	5.10
11	4.18	4.29	4.40	4.51	4.62	4.73	4.84	4.95	5.06	5.17	5.28	5.39	5.50	5.61
12	4.56	4.68	4.80	4.92	5.04	5.16	5.28	5.40	5.52	5.64	5.76	5.88	6.00	6.12
13	4.94	5.07	5.20	5.33	5.46	5.59	5.72	5.85	5.98	6.11	6.24	6.37	6.50	6.63
14	5.32	5.46	5.60	5.74	5.88	6.02	6.16	6.30	6.44	6.58	6.72	6.86	7.00	7.14
15	5.70	5.85	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	7.50	7.65
16	6.08	6.24	6.40	6.56	6.72	6.88	7.04	7.20	7.36	7.52	7.68	7.84	8.00	8.16
17	6.46	6.63	6.80	6.97	7.14	7.31	7.48	7.65	7.82	7.99	8.16	8.33	8.50	8.67
18	6.84	7.02	7.20	7.38	7.56	7.74	7.92	8.10	8.28	8.46	8.64	8.82	9.00	9.18
19	7.22	7.41	7.60	7.79	7.98	8.17	8.36	8.55	8.74	8.93	9.12	9.31	9.50	9.69
20	7.60	7.80	8.00	8.20	8.40	8.60	8.80	9.00	9.20	9.40	9.60	9.80	10.00	10.20
21	7.98	8.19	8.40	8.61	8.82	9.03	9.24	9.45	9.66	9.87	10.08	10.29	10.50	10.71
22	8.36	8.58	8.80	9.02	9.24	9.46	9.68	9.90	10.12	10.34	10.56	10.78	11.00	11.22
23	8.74	8.97	9.20	9.43	9.66	9.89	10.12	10.35	10.58	10.81	11.04	11.27	11.50	11.73
24	9.12	9.36	9.60	9.84	10.08	10.32	10.56	10.80	11.04	11.28	11.52	11.76	12.00	12.24
25	9.50	9.75	10.00	10.25	10.50	10.75	11.00	11.25	11.50	11.75	12.00	12.25	12.50	12.75
30	11.40	11.70	12.00	12.30	12.60	12.90	13.20	13.50	13.80	14.10	14.40	14.70	15.00	15.30
40	15.20	15.60	16.00	16.40	16.80	17.20	17.60	18.00	18.40	18.80	19.20	19.60	20.00	20.40
50	19.00	19.50	20.00	20.50	21.00	21.50	22.00	22.50	23.00	23.50	24.00	24.50	25.00	25.50
60	22.80	23.40	24.00	24.60	25.20	25.80	26.40	27.00	27.60	28.20	28.80	29.40	30.00	30.60
70	26.60	27.30	28.00	28.70	29.40	30.10	30.80	31.50	32.20	32.90	33.60	34.30	35.00	35.70
80	30.40	31.20	32.00	32.80	33.60	34.40	35.20	36.00	36.80	37.60	38.40	39.20	40.00	40.80
90	34.20	35.10	36.00	36.90	37.80	38.70	39.60	40.50	41.40	42.30	43.20	44.10	45.00	45.90
100	38.00	39.00	40.00	41.00	42.00	43.00	44.00	45.00	46.00	47.00	48.00	49.00	50.00	51.00

Nos.	52 ct.	53 ct.	54 ct.	55 ct.	56 ct.	57 ct.	58 ct.	59 ct.	60 ct.	61 ct.	62 ct.	62½ ct.	63 ct.
2	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.25	1.26
3	1.56	1.59	1.62	1.65	1.68	1.71	1.74	1.77	1.80	1.83	1.86	1.87½	1.89
4	2.08	2.12	2.16	2.20	2.24	2.28	2.32	2.36	2.40	2.44	2.48	2.50	2.52
5	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.12½	3.15
6	3.12	3.18	3.24	3.30	3.36	3.42	3.48	3.54	3.60	3.66	3.72	3.75	3.78
7	3.64	3.71	3.78	3.85	3.92	3.99	4.06	4.13	4.20	4.27	4.34	4.37½	4.41
8	4.16	4.24	4.32	4.40	4.48	4.56	4.64	4.72	4.80	4.88	4.96	5.00	5.04
9	4.68	4.77	4.86	4.95	5.04	5.13	5.22	5.31	5.40	5.49	5.58	5.62½	5.67
10	5.20	5.30	5.40	5.50	5.60	5.70	5.80	5.90	6.00	6.10	6.20	6.25	6.30
11	5.72	5.83	5.94	6.05	6.16	6.27	6.38	6.49	6.60	6.71	6.82	6.87½	6.93
12	6.24	6.36	6.48	6.60	6.72	6.84	6.96	7.08	7.20	7.32	7.44	7.50	7.56
13	6.76	6.89	7.02	7.15	7.28	7.41	7.54	7.67	7.80	7.93	8.06	8.12½	8.19
14	7.28	7.42	7.56	7.70	7.84	7.98	8.12	8.26	8.40	8.54	8.68	8.75	8.82
15	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	9.00	9.15	9.30	9.37½	9.45
16	8.32	8.48	8.64	8.80	8.96	9.12	9.28	9.44	9.60	9.76	9.92	10.00	10.08
17	8.84	9.01	9.18	9.35	9.52	9.69	9.86	10.03	10.20	10.37	10.54	10.62½	10.71
18	9.36	9.54	9.72	9.90	10.08	10.26	10.44	10.62	10.80	10.98	11.16	11.25	11.34
19	9.88	10.07	10.26	10.45	10.64	10.83	11.02	11.21	11.40	11.59	11.78	11.87½	11.97
20	10.40	10.60	10.80	11.00	11.20	11.40	11.60	11.80	12.00	12.20	12.40	12.50	12.60
21	10.92	11.13	11.34	11.55	11.76	11.97	12.18	12.39	12.60	12.81	13.02	13.12½	13.23
22	11.44	11.66	11.88	12.10	12.32	12.54	12.76	12.98	13.20	13.42	13.64	13.75	13.86
23	11.96	12.19	12.42	12.65	12.88	13.11	13.34	13.57	13.80	14.03	14.26	14.37½	14.49
24	12.48	12.72	12.96	13.20	13.44	13.68	13.92	14.16	14.40	14.64	14.88	15.00	15.12
25	13.00	13.25	13.50	13.75	14.00	14.25	14.50	14.75	15.00	15.25	15.50	15.62½	15.75
30	15.60	15.90	16.20	16.50	16.80	17.10	17.40	17.70	18.00	18.30	18.60	18.75	18.90
40	20.80	21.20	21.60	22.00	22.40	22.80	23.20	23.60	24.00	24.40	24.80	25.00	25.20
50	26.00	26.50	27.00	27.50	28.00	28.50	29.00	29.50	30.00	30.50	31.00	31.25	31.50
60	31.20	31.80	32.40	33.00	33.60	34.20	34.80	35.40	36.00	36.60	37.20	37.50	37.80
70	36.40	37.10	37.80	38.50	39.20	39.90	40.60	41.30	42.00	42.70	43.40	43.75	44.10
80	41.60	42.40	43.20	44.00	44.80	45.60	46.40	47.20	48.00	48.80	49.60	50.00	50.40
90	46.80	47.70	48.60	49.50	50.40	51.30	52.20	53.10	54.00	54.90	55.80	56.25	56.70
100	52.00	53.00	54.00	55.00	56.00	57.00	58.00	59.00	60.00	61.00	62.00	62.50	63.00

Nos.	64 ct.	65 ct.	66 ct.	66⅔ ct.	67 ct.	68 ct.	69 ct.	70 ct.	71 ct.	72 ct.	73 ct.	74 ct.	75 ct.
2	1.28	1.30	1.32	1.33⅓	1.34	1.36	1.38	1.40	1.42	1.44	1.46	1.48	1.50
3	1.92	1.95	1.98	2.00	2.01	2.04	2.07	2.10	2.13	2.16	2.19	2.22	2.25
4	2.56	2.60	2.64	2.66⅔	2.68	2.72	2.76	2.80	2.84	2.88	2.92	2.96	3.00
5	3.20	3.25	3.30	3.33⅓	3.35	3.40	3.45	3.50	3.55	3.60	3.65	3.70	3.75
6	3.84	3.90	3.96	4.00	4.02	4.08	4.14	4.20	4.26	4.32	4.38	4.44	4.50
7	4.48	4.55	4.62	4.66⅔	4.69	4.76	4.83	4.90	4.97	5.04	5.11	5.18	5.25
8	5.12	5.20	5.28	5.33⅓	5.36	5.44	5.52	5.60	5.63	5.76	5.84	5.92	6.00
9	5.76	5.85	5.94	6.00	6.03	6.12	6.21	6.30	6.39	6.48	6.57	6.66	6.75
10	6.40	6.50	6.60	6.66⅔	6.70	6.80	6.90	7.00	7.10	7.20	7.30	7.40	7.50
11	7.04	7.15	7.26	7.33⅓	7.37	7.48	7.59	7.70	7.81	7.92	8.03	8.14	8.25
12	7.68	7.80	7.92	8.00	8.04	8.16	8.28	8.40	8.52	8.64	8.76	8.88	9.00
13	8.32	8.45	8.58	8.66⅔	8.71	8.84	8.97	9.10	9.23	9.36	9.49	9.62	9.75
14	8.96	9.10	9.24	9.33⅓	9.38	9.52	9.66	9.80	9.94	10.08	10.22	10.36	10.50
15	9.60	9.75	9.90	10.00	10.05	10.20	10.35	10.50	10.65	10.80	10.95	11.10	11.25
16	10.24	10.40	10.56	10.66⅔	10.72	10.88	11.04	11.20	11.36	11.52	11.68	11.84	12.00
17	10.88	11.05	11.22	11.33⅓	11.39	11.56	11.73	11.90	12.07	12.24	12.41	12.58	12.75
18	11.52	11.70	11.88	12.00	12.06	12.24	12.42	12.60	12.78	12.96	13.14	13.32	13.50
19	12.16	12.35	12.54	12.66⅔	12.73	12.92	13.11	13.30	13.49	13.68	13.87	14.06	14.25
20	12.80	13.00	13.20	13.33⅓	13.40	13.60	13.80	14.00	14.20	14.40	14.60	14.80	15.00
21	13.44	13.65	13.86	14.00	14.07	14.28	14.49	14.70	14.91	15.12	15.33	15.54	15.75
22	14.08	14.30	14.52	14.66⅔	14.74	14.96	15.18	15.40	15.62	15.84	16.06	16.28	16.50
23	14.72	14.95	15.18	15.33⅓	15.41	15.64	15.87	16.10	16.33	16.56	16.79	17.02	17.25
24	15.36	15.60	15.84	16.00	16.08	16.32	16.56	16.80	17.04	17.28	17.52	17.76	18.00
25	16.00	16.25	16.50	16.66⅔	16.75	17.00	17.25	17.50	17.75	18.00	18.25	18.50	18.75
30	19.20	19.50	19.80	20.00	20.10	20.40	20.70	21.00	21.30	21.60	21.90	22.20	22.50
40	25.60	26.00	26.40	26.66⅔	26.80	27.20	27.60	28.00	28.40	28.80	29.20	29.60	30.00
50	32.00	32.50	33.00	33.33⅓	33.50	34.00	34.50	35.00	35.50	36.00	36.50	37.00	37.50
60	38.40	39.00	39.60	40.00	40.20	40.80	41.40	42.00	42.60	43.20	43.80	44.40	45.00
70	44.80	45.50	46.20	46.66⅔	46.90	47.60	48.30	49.00	49.70	50.40	51.10	51.80	52.50
80	51.20	52.00	52.80	53.33⅓	53.60	54.40	55.20	56.00	56.80	57.60	58.40	59.20	60.00
90	57.60	58.50	59.40	60.00	60.30	61.20	62.10	63.00	63.90	64.80	65.70	66.60	67.50
100	64.00	65.00	66.00	66.66⅔	67.00	68.00	69.00	70.00	71.00	72.00	73.00	74.00	75.00

Nos.	76 ct.	77 ct.	78 ct.	79 ct.	80 ct.	81 ct.	82 ct.	83 ct.	84 ct.	85 ct.	86 ct.	87 ct.	87½ ct.	88 ct.
2	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	1.75	1.76
3	2.28	2.31	2.34	2.37	2.40	2.43	2.46	2.49	2.52	2.55	2.58	2.61	2.62½	2.64
4	3.04	3.08	3.12	3.16	3.20	3.24	3.28	3.32	3.36	3.40	3.44	3.48	3.50	3.52
5	3.80	3.85	3.90	3.95	4.00	4.05	4.10	4.15	4.20	4.25	4.30	4.35	4.37½	4.40
6	4.56	4.62	4.68	4.74	4.80	4.86	4.92	4.98	5.04	5.10	5.16	5.22	5.25	5.28
7	5.32	5.39	5.46	5.53	5.60	5.67	5.74	5.81	5.88	5.95	6.02	6.09	6.12½	6.16
8	6.08	6.16	6.24	6.32	6.40	6.48	6.56	6.64	6.72	6.80	6.88	6.96	7.00	7.04
9	6.84	6.93	7.02	7.11	7.20	7.29	7.38	7.47	7.56	7.65	7.74	7.83	7.87½	7.92
10	7.60	7.70	7.80	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.75	8.80
11	8.36	8.47	8.58	8.69	8.80	8.91	9.02	9.13	9.24	9.35	9.46	9.57	9.62½	9.68
12	9.12	9.24	9.36	9.48	9.60	9.72	9.84	9.96	10.08	10.20	10.32	10.44	10.50	10.56
13	9.88	10.01	10.14	10.27	10.40	10.53	10.66	10.79	10.92	11.05	11.18	11.31	11.37½	11.44
14	10.64	10.78	10.92	11.06	11.20	11.34	11.48	11.62	11.76	11.90	12.04	12.18	12.25	12.32
15	11.40	11.55	11.70	11.85	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.12½	13.20
16	12.16	12.32	12.48	12.64	12.80	12.96	13.12	13.28	13.44	13.60	13.76	13.92	14.00	14.08
17	12.92	13.09	13.26	13.43	13.60	13.77	13.94	14.11	14.28	14.45	14.62	14.79	14.87½	14.96
18	13.68	13.86	14.04	14.22	14.40	14.58	14.76	14.94	15.12	15.30	15.48	15.66	15.75	15.84
19	14.44	14.63	14.82	15.01	15.20	15.39	15.58	15.77	15.96	16.15	16.34	16.53	16.62½	16.72
20	15.20	15.40	15.60	15.80	16.00	16.20	16.40	16.60	16.80	17.00	17.20	17.40	17.50	17.60
21	15.96	16.17	16.38	16.59	16.80	17.01	17.22	17.43	17.64	17.85	18.06	18.27	18.37½	18.48
22	16.72	16 94	17.16	17.38	17.60	17.82	18.04	18.26	18.48	18.70	18.92	19.14	19.25	19.36
23	17.48	17.71	17.94	18.17	18.40	18.63	18.86	19.09	19.32	19.55	19.78	20.01	20.12½	20.24
24	18.24	18.48	18.72	18.96	19.20	19.41	19.68	19.92	20.16	20.40	20.64	20.88	21.00	21.12
25	19.00	19.25	19.50	19.75	20.00	20.25	20.50	20.75	21.00	21.25	21.50	21.75	21.87½	22.00
30	22.80	23.10	23.40	23.70	24.00	24.30	24.60	24.90	25.20	25.50	25.80	26.10	26.25	26.40
40	30.40	30 80	31.20	31.60	32.00	32.40	32.80	33.20	33.60	34.00	34.40	34.80	35.00	35.20
50	38.00	38.50	30.00	39.50	40.00	40.50	41.00	41.50	42.00	42.50	43.00	43.50	43.75	44.00
60	45.60	46.20	46.80	47.40	48.00	48.60	49.20	49.80	50.40	51.00	51.60	52.20	52.50	52.80
70	53.20	53.90	54.60	55.30	56.00	56.70	57.40	58.10	58.80	59.50	60.20	60.90	61.25	61.60
80	60.80	61.60	62.40	63.20	64.00	64.80	65.60	66.40	67.20	68.00	68.80	69.60	70.00	70.40
90	68.40	69.30	70.20	71.10	72.00	72.90	73.80	74.70	75.60	76.50	77.40	78.30	78.75	79.20
100	76.00	77.00	78.00	79.00	80.00	81.00	82.00	83.00	84.00	85.00	86.00	87.00	87.50	88.00

Nos.	89 ct.	90 ct.	91 ct.	92 ct.	93 ct.	94 ct.	95 ct.	96 ct.	97 ct.	98 ct.	99 ct.	$1.	$2.	$3.
2	1.78	1.80	1.82	1.84	1.86	1.88	1.90	1.92	1.94	1.96	1.98	2.	4.	6.
3	2.67	2.70	2.73	2.76	2.79	2.82	2.85	2.88	2.91	2.94	2.97	3.	6.	9.
4	3.56	3.60	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.92	3.96	4.	8.	12.
5	4.45	4.50	4.55	4.60	4.65	4.70	4.75	4.80	4.85	4.90	4.95	5.	10.	15.
6	5.34	5.40	5.46	5.52	5.58	5.64	5.70	5.76	5.82	5.88	5.94	6.	12.	18.
7	6.23	6.30	6.37	6.44	6.51	6.58	6.65	6.72	6.79	6.86	6.93	7.	14.	21.
8	7.12	7.20	7.28	7.36	7.44	7.52	7.60	7.68	7.76	7.84	7.92	8.	16.	24.
9	8.01	8.10	8.19	8.28	8.37	8.46	8.55	8.64	8.73	8.82	8.91	9.	18.	27.
10	8.90	9.00	9.10	9.20	9.30	9.40	9.50	9.60	9.70	9.80	9.90	10.	20.	30.
11	9.79	9.90	10.01	10.12	10.23	10.34	10.45	10.56	10.67	10.78	10.89	11.	22.	33.
12	10.68	10.80	10.92	11.04	11.16	11.28	11.40	11.52	11.64	11.76	11.88	12.	24.	36.
13	11.57	11.70	11.83	11.96	12.09	12.22	12.35	12.48	12.61	12.74	12.87	13.	26.	39.
14	12.46	12.60	12.74	12.88	13.02	13.16	13.30	13.44	13.58	13.72	13.86	14.	28.	42.
15	13.35	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	15.	30.	45.
16	14.24	14.40	14.56	14.72	14.88	15.04	15.20	15.36	15.52	15.68	15.84	16.	32.	48.
17	15.13	15.30	15.47	15.64	15.81	15.98	16.15	16.32	16.49	16.66	16.83	17.	34.	51.
18	16.02	16.20	16.38	16.56	16.74	16.92	17.10	17.28	17.46	17.64	17.82	18.	36.	54.
19	16.91	17.10	17.29	17.48	17.67	17.86	18.05	18.24	18.43	18.62	18.81	19.	38.	57.
20	17.80	18.00	18.20	18.40	18.60	18.80	19.00	19.20	19.40	19.60	19.80	20.	40.	60.
21	18.69	18.90	19.11	19.32	19.53	19.74	19.95	20.16	20.37	20.58	20.79	21.	42.	63.
22	19.58	19.80	20.02	20.24	20.46	20.68	20.90	21.12	21.34	21.56	21.78	22.	44.	66.
23	20.47	20.70	20.93	21.16	21.39	21.62	21.85	22.08	22.31	22.54	22.77	23.	46.	69.
24	21.36	21.60	21.84	22.08	22.32	22.56	22.80	23.04	23.28	23.52	23.76	24.	48.	72.
25	22.25	22.50	22.75	23.00	23.25	23.50	23.75	24.00	24.25	24.50	24.75	25.	50.	75.
30	26.70	27.00	27.30	27.60	27.90	28.20	28.50	28.80	29.10	29.40	29.70	30.	60.	90.
40	35.60	36.00	36.40	36.80	37.20	37.60	38.00	38.40	38.80	39.20	39.60	40.	80.	120.
50	44.50	45.00	45.50	46.00	46.50	47.00	47.50	48.00	48.50	49.00	49.50	50.	100.	150.
60	53.40	54.00	54.60	55.20	55.80	56.40	57.00	57.60	58.20	58.80	59.40	60.	120.	180.
70	62.30	63.00	63.70	64.40	65.10	65.80	66.50	67.20	67.90	68.60	69.30	70.	140.	210.
80	71.20	72.00	72.80	73.60	74.40	75.20	76.00	76.80	77.60	78.40	79.20	80.	160.	240.
90	80.10	81.00	81.90	82.80	83.70	84.60	85.50	86.40	87.30	88.20	89.10	90.	180.	270.
100	89.00	90.00	91.00	92.00	93.00	94.00	95.00	96.00	97.00	98.00	99.00	100.	200.	300.

No.	Square root.	Cube root.	No.	Square root.	Cube root.	No.	Square root.	Cube root.	No.	Square root.	Cube root.
1	1.	1.	69	8.3066	4.101	137	11.7046	5.155	205	14.3178	5.896
2	1.4142	1.259	70	8 3666	4.121	138	11.7473	5.167	206	14.3527	5.905
3	1.7320	1.442	71	8.4261	4.140	139	11.7898	5.189	207	14.3874	5.915
4	2.	1.587	72	8.4852	4.160	140	11.8321	5.192	208	14.4222	5.924
5	2.2360	1.709	73	8.5440	4.179	141	11.8743	5.204	209	14.4568	5.934
6	2.4494	1.817	74	8.6023	4.198	142	11.9163	5.217	210	14.4913	5.943
7	2.6457	1.912	75	8.6602	4.217	143	11.9582	5.229	211	14.5258	5.953
8	2.8284	2.	76	8.7177	4.235	144	12.	5.241	212	14.5602	5.962
9	3.	2.080	77	8.7749	4.254	145	12.0415	5.253	213	14.5945	5.972
10	3.1622	2.154	78	8.8317	4.272	146	12.0830	5.265	214	14.6287	5.981
11	3.3166	2.223	79	8.8881	4.290	147	12.1243	5.277	215	14.6628	5.990
12	3.4641	2.289	80	8.9442	4.308	148	12.1655	5.289	216	14.6969	6.
13	3.6055	2.351	81	9.	4.326	149	12.2065	5.301	217	14.7309	6.009
14	3.7416	2.410	82	9.0553	4.344	150	12.2474	5.313	218	14.7648	6.018
15	3.8729	2.466	83	9.1104	4.362	151	12.2882	5.325	219	14.7986	6.027
16	4.	2.519	84	9.1651	4.379	152	12.3288	5.336	220	14.8323	6.036
17	4.1231	2.571	85	9.2195	4.396	153	12.3693	5.348	221	14.8660	6.045
18	4.2426	2 620	86	9.2736	4.414	154	12.4096	5.360	222	14.8996	6.055
19	4.3588	2 668	87	9.3273	4.431	155	12.4498	5.371	223	14.9331	6.064
20	4 4721	2.714	88	9.3808	4.447	156	12.4899	5.383	224	14.9666	6.073
21	4.5825	2.758	89	9.4339	4.464	157	12.5299	5.394	225	15.	6.082
22	4.6904	2.802	90	9.4868	4.481	158	12 5698	5.406	226	15.0332	6.091
23	4 7958	2.843	91	9.5393	4.497	159	12.6095	5.417	227	15.0665	6.100
24	4.8989	2.884	92	9.5916	4.514	160	12.6491	5.428	228	15.0996	6.109
25	5.	2.924	93	9.6436	4 530	161	12.6885	5.440	229	15.1327	6.118
26	5.0990	2.962	94	9.6953	4.546	162	12.7279	5.451	230	15.1657	6.126
27	5.1961	3.	95	9.7467	4.562	163	12.7671	5.462	231	15.1986	6.135
28	5.2915	3.036	96	9.7979	4.578	164	12.8062	5.473	232	15.2315	6.144
29	5 3851	3.072	97	9.8488	4.594	165	12.8452	5.484	333	15.2643	6.153
30	5.4772	3.107	98	9.8994	4.610	166	12.8840	5.495	234	15.2970	6.162
31	5.5677	3.141	99	9.9498	4.626	167	12.9228	5.506	235	15.3297	6.171
32	5.6568	3.174	100	10.	4.641	168	12.9614	5.517	236	15.3622	6.179
33	5.7445	3.207	101	10.0498	4.657	169	13.	5.528	237	15.3948	6.188
34	5.8309	3.239	102	10.0995	4.672	170	13.0384	5.539	238	15.4272	6.197
35	5.9160	3.271	103	10.1488	4.687	171	13.0766	5.550	239	15.4596	6.205
36	6.	3.301	104	10.1980	4.702	172	13.1148	5.561	240	15.4919	6.214
37	6.0827	3.332	105	10.2469	4.717	173	13.1529	5.572	241	15.5241	6.223
38	6.1644	3.361	106	10.2956	4.732	174	13.1909	5.582	242	15.5563	6.231
39	6 2449	3.391	107	10.3440	4.747	175	13.2287	5.593	243	15.5884	6.240
40	6.3245	3.419	108	10.3923	4.762	176	13.2664	5.604	244	15.6204	6.248
41	6.4031	3.448	109	10.4403	4.776	177	13.3041	5.614	245	15.6524	6.257
42	6.4807	3.476	110	10.4880	4.791	178	13.3416	5.625	246	15.6843	6.265
43	6.5574	3.503	111	10.5356	4.805	179	13.3790	5.635	247	15.7162	6.274
44	6.6332	3.530	112	10.5830	4.820	180	13.4164	5.646	248	15.7480	6.282
45	6.7082	3.556	113	10.6301	4.834	181	13.4536	5.656	249	15.7797	6.291
46	6.7823	3.583	114	10.6770	4.848	182	13.4907	5.667	250	15.8113	6.299
47	6.8556	3.608	115	10.7238	4.862	183	13.5277	5.677	251	15.8429	6.307
48	6.9282	3.634	116	10.7703	4.876	184	13.5646	5.687	252	15.8745	6.316
49	7.	3.659	117	10.8166	4.890	185	13.6014	5.698	253	15.9059	6.324
50	7.0710	3.684	118	10.8627	4.904	186	13.6381	5.708	254	15.9373	6.333
51	7.1414	3.708	119	10.9087	4.918	187	13.6747	5.718	255	15.9687	6.341
52	7.2111	3.732	120	10.9544	4.932	188	13.7113	5.728	256	16.	6.349
53	7.2801	3.756	121	11.	4.946	189	13.7477	5.738	257	16.0312	6.357
54	7.3484	3.779	122	11.0453	4.959	190	13.7840	5.748	258	16.0623	6.366
55	7.4161	3.802	123	11.0905	4.973	191	13.8202	5.758	259	16.0934	6.374
56	7.4833	3.825	124	11.1355	4.986	192	13.8564	5.768	260	16.1245	6.382
57	7.5498	3.848	125	11.1803	5.	193	13.8924	5.778	261	16.1554	6.390
58	7.6157	3.870	126	11.2249	5.013	194	13.9283	5.788	262	16.1864	6.398
59	7.6811	3.892	127	11.2694	5.026	195	13.9642	5.798	263	16 2172	6.406
60	7.7459	3.914	128	11.3137	5.039	196	14.	5.808	264	16.2480	6.415
61	7.8102	3.936	129	11.3578	5.052	197	14.0356	5.818	265	16.2788	6.423
62	7.8740	3.957	130	11.4017	5.065	198	14.0712	5.828	266	16.3095	6.431
63	7.9372	3.979	131	11.4455	5.078	199	14.1067	5.838	267	16.3401	6.439
64	8.	4.	132	11.4891	5.091	200	14.1421	5.848	268	16 3707	6.447
65	8.0622	4.020	133	11.5325	5.104	201	14.1774	5.857	269	16.4012	6.455
66	8.1240	4.041	134	11.5758	5.117	202	14.2126	5.867	270	16.4316	6.463
67	8.1853	4.061	135	11.6189	5.129	203	14.2478	5.877	271	16.4620	6.471
68	8.2462	4.081	136	11.6619	5.142	204	14.2828	5.886	272	16.4924	6.479

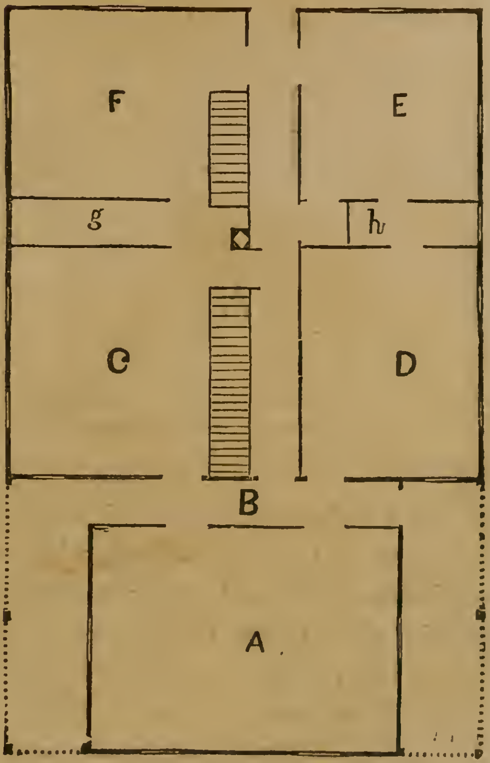
No.	Square root.	Cube root.	No.	Square root.	Cube root.	No.	Square root.	Cube root.	No.	Square root.	Cube root.
273	16.5227	6.487	341	18.4661	6.986	409	20.2237	7.422	477	21.8403	7.813
274	16.5529	6.495	342	18.4932	6.993	410	20.2484	7.428	478	21.8632	7.818
275	16.5831	6.502	343	18.5202	7.	411	20.2731	7.434	479	21.8860	7.824
276	16.6132	6.510	344	18.5472	7.006	412	20.2977	7.441	480	21.9089	7.829
277	16.6433	6.518	345	18.5741	7.013	413	20.3224	7.447	481	21.9317	7.835
278	16.6733	6.526	346	18.6010	7.020	414	20.3469	7.453	482	21.9544	7.840
279	16.7032	6.534	347	18.6279	7.027	415	20.3715	7.459	483	21.9772	7.846
280	16.7332	6.542	348	18.6547	7.033	416	20.3960	7.465	484	22.	7.851
281	16.7630	6.549	349	18.6815	7.040	417	20.4205	7.470	485	22.0227	7.856
282	16.7928	6.557	350	18.7082	7.047	418	20.4450	7.476	486	22.0454	7.862
283	16.8226	6.565	351	18.7349	7.054	419	20.4694	7.482	487	22.0680	7.867
284	16.8522	6.573	352	18.7616	7.060	420	20.4939	7.488	488	22.0907	7.872
285	16.8819	6.580	353	18.7882	7.067	421	20.5182	7.494	489	22.1133	7.878
286	16.9115	6.588	354	18.8148	7.074	422	20.5426	7.500	490	22.1359	7.883
287	16.9410	6.596	355	18.8414	7.080	423	20.5669	7.506	491	22.1585	7.889
288	16.9705	6.603	356	18.8679	7.087	424	20.5912	7.512	492	22.1810	7.894
289	17.	6.611	357	18.8944	7.093	425	20.6155	7.518	493	22.2036	7.899
290	17.0293	6.619	358	18.9208	7.100	426	20.6397	7.524	494	22.2261	7.905
291	17.0587	6.626	359	18.9472	7.107	427	20.6639	7.530	495	22.2485	7.901
292	17.0880	6.634	360	18.9736	7.113	428	20.6881	7.536	496	22.2710	7.915
293	17.1172	6.641	361	19.	7.120	429	20.7123	7.541	497	22.2934	7.921
294	17.1464	6.649	362	19.0262	7.126	430	20.7364	7.547	498	22.3159	7.926
295	17.1755	6.656	363	19.0525	7.133	431	20.7605	7.553	499	22.3383	7.931
296	17.2046	6.664	364	19.0787	7.140	432	20.7846	7.559	500	22.3606	7.937
297	17.2336	6.671	365	19.1049	7.146	433	20.8086	7.565	501	22.3830	7.942
298	17.2626	6.679	366	19.1311	7.153	434	20.8326	7.571	502	22.4053	7.947
299	17.2916	6.686	367	19.1572	7.159	435	20.8566	7.576	503	22.4276	7.952
300	17.3205	6.694	368	19.1833	7.166	436	20.8806	7.582	504	22.4499	7.958
301	17.3493	6.701	369	19.2093	7.172	437	20.9045	7.588	505	22.4722	7.963
302	17.3781	6.709	370	19.2353	7.179	438	20.9284	7.594	506	22.4944	7.968
303	17.4068	6.716	371	19.2613	7.185	439	20.9523	7.600	507	22.5166	7.973
304	17.4355	6.723	372	19.2873	7.191	440	20.9761	7.605	508	22.5388	7.979
305	17.4642	6.731	373	19.3132	7.198	441	21.	7.611	509	22.5610	7.984
306	17.4928	6.738	374	19.3390	7.204	442	21.0237	7.617	510	22.5831	7.989
307	17.5214	6.745	375	19.3649	7.211	443	21.0475	7.623	511	22.6053	7.994
308	17.5499	6.753	376	19.3907	7.217	444	21.0713	7.628	512	22.6274	8.
309	17.5783	6.760	377	19.4164	7.224	445	21.0950	7.634	513	22.6495	8.005
310	17.6068	6.767	378	19.4422	7.230	446	21.1187	7.640	514	22.6715	8.010
311	17.6351	6.775	379	19.4679	7.236	447	21.1423	7.646	515	22.6936	8.015
312	17.6635	6.782	380	19.4935	7.243	448	21.1660	7.651	516	22.7156	8.020
313	17.6918	6.789	381	19.5192	7.249	449	21.1896	7.657	517	22.7376	8.025
314	17.7200	6.796	382	19.5448	7.255	450	21.2132	7.663	518	22.7596	8.031
315	17.7482	6.804	383	19.5703	7.262	451	21.2367	7.668	519	22.7815	8.036
316	17.7763	6.811	384	19.5959	7.268	452	21.2602	7.674	520	22.8035	8.041
317	17.8044	6.818	385	19.6214	7.274	453	21.2837	7.689	521	22.8254	8.046
318	17.8325	6.825	386	19.6468	7.281	454	21.3072	7.685	522	22.8473	8.051
319	17.8605	6.832	387	19.6723	7.287	455	21.3307	7.691	523	22.8691	8.056
320	17.8885	6.839	388	19.6977	7.293	456	21.3541	7.697	524	22.8910	8.062
321	17.9164	6.847	389	19.7230	7.299	457	21.3775	7.702	525	22.9128	8.067
322	17.9443	6.854	390	19.7484	7.306	458	21.4009	7.708	526	22.9346	8.072
323	17.9722	6.861	391	19.7737	7.312	459	21.4242	7.713	527	22.9564	8.077
324	18.	6.868	392	19.7989	7.318	460	21.4476	7.719	528	22.9782	8.082
325	18.0277	6.875	393	19.8242	7.324	461	21.4709	7.725	529	23.	8.087
326	18.0554	6.882	394	19.8494	7.331	462	21.4941	7.730	530	23.0217	8.092
327	18.0831	6.889	395	19.8746	7.337	463	21.5174	7.736	531	23.0434	8.097
328	18.1107	6.896	396	19.8997	7.343	464	21.5406	7.741	532	23.0651	8.102
329	18.1383	6.903	397	19.9248	7.349	465	21.5638	7.747	533	23.0867	8.107
330	18.1659	6.910	398	19.9499	7.355	466	21.5870	7.752	534	23.1084	8.112
331	18.1934	6.917	399	19.9749	7.361	467	21.6101	7.758	535	23.1300	8.118
332	18.2208	6.924	400	20.	7.368	468	21.6333	7.763	536	23.1516	8.123
333	18.2482	6.931	401	20.0249	7.374	469	21.6564	7.769	537	23.1732	8.128
334	18.2756	6.938	402	20.0499	7.380	470	21.6794	7.774	538	23.1948	8.133
335	18.3030	6.945	403	20.0748	7.386	471	21.7025	7.780	539	23.2163	8.138
336	18.3303	6.952	404	20.0997	7.392	472	21.7255	7.785	540	23.2379	8.143
337	18.3575	6.958	405	20.1246	7.398	473	21.7485	7.791	541	23.2594	8.148
338	18.3847	6.965	406	20.1494	7.404	474	21.7715	7.796	542	23.2808	8.153
339	18.4119	6.972	407	20.1742	7.410	475	21.7944	7.802	543	23.3023	8.158
340	18.4390	6.979	408	20.1990	7.416	476	21.8174	7.807	544	23.3238	8.163

SUMMERSIDE.

Print by J. Andrews

PLANS AND ILLUSTRATIONS.

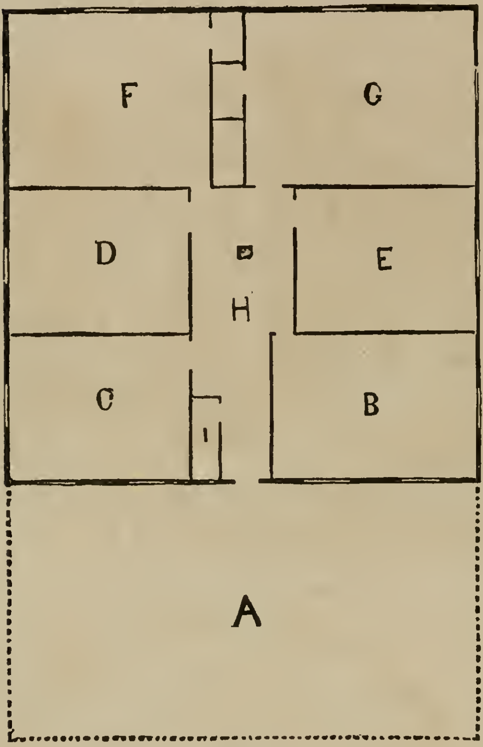
For special remarks on plans of houses see the Introduction to this work.



No. 1.

No. 1 is a proposed plan of a village house the author made for Mr. A. Lyon, of Worcester, Mass. A is the parlor in front, so placed as not to exclude a view of street from either of the rooms back of it, as also to give side views from the room itself and piazza. B is the hall, having entrances on either side of the parlor, and easily communicating with any part of the house. Many persons prefer quite a large parlor, and as nearly distinct as may be from the other portions of the building. This plan effects this purpose, and yet the room is easy of access from any part of the house, or from without. A hall ranges from B to rear of the house, communicating with all parts of lower floor, as also the upper story. C is a dining room; D, a family sitting room; E, a bed room; F, kitchen; *g*, pantry; *h*, closet.

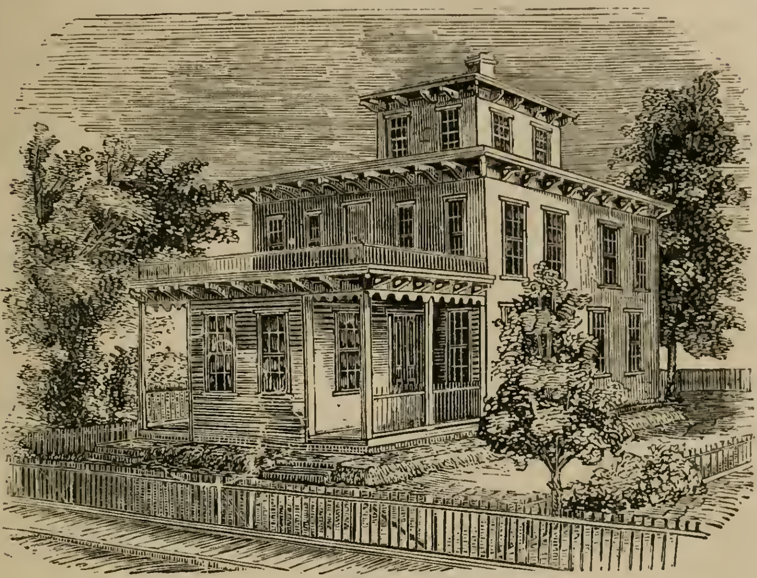
No. 2 is a second story plan divided into several rooms for bed rooms and stores, as may best suit the purposes of the occupants. It has a communication to a pleasant walk, enclosed, over the parlor and piazzas below, which have a flat roof. Should it be deemed advisable, a large dome window can be made over the parlor. Cost, from $1800 to $2200.



No. 2.

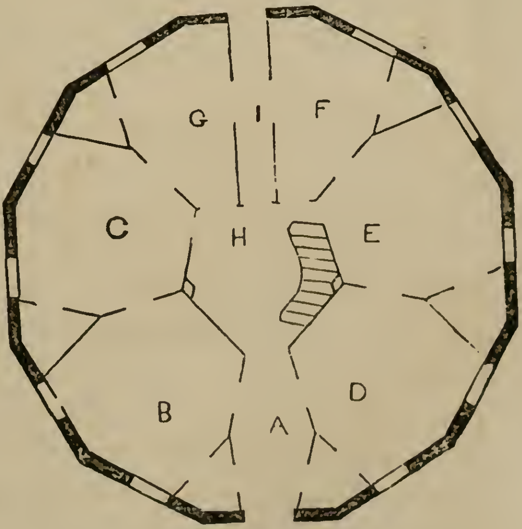
No. 3 is the front elevation of the same, with an observatory.

No. 4 is a twelve-sided figure, with a novel division of the space enclosed, intended not merely for the fanciful, but presenting some special claim to the consideration of those desiring special and convenient apartments. A is a front hall, communicating with all parts of the house, without interference with any other portion or room. B is a family living room, with a bed room, C, adjoining which is also attached a children's bed room, G, with closets attached to each. D is a parlor; E, dining room; F, kitchen; H and I, centre and rear halls; cellar and chamber stairs conveniently affixed, and the chimneys readily accommodating the several rooms. Cost, $2000, finished with observatory.



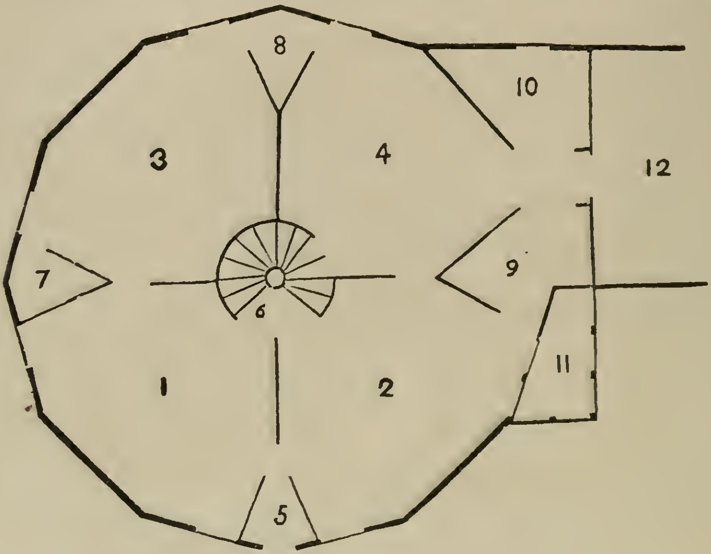
No. 3.

No. 5 is also a twelve-sided building, arranged with side room for wood and summer work. Fig. 1, parlor; 2 is a second parlor, used as a dining or sitting room; 3, a family bed room; 4, kitchen; 5, front hall; 6, stairway communicating with both parlors, kitchen, chamber, and cellar; 7,

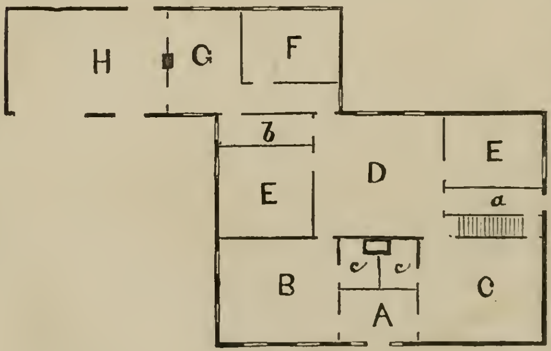


No. 4.

closet; 8, ditto. If thought desirable, a more direct communication can be made with 3 and 4. Fig. 9 is a china closet and pantry; 10, pantry; 11, conservatory; 12, wood room and summer kitchen. Second story similarly arranged with the main building; the other portions are of one story only. This plan can be built for $1600 to $2000, or even less in a common quality of stock and finish.



No. 5.



No. 6.

No. 6 is an old-fashioned plan, acceptable only to a few. A is the front hall; B, the

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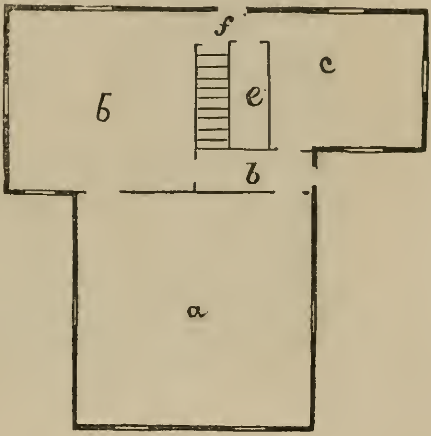
Note. — Plans like Nos. 4 and 5 have the special advantage of bringing the rooms near each other, saving time and labor when it is required to pass from one part to another — a duty constantly required of all housekeepers.

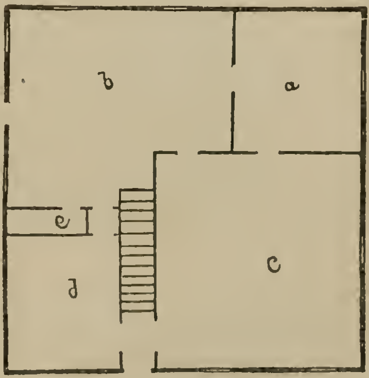
parlor; C, a dining and sitting room; D, kitchen; E, small bed room; F, pantry; G, back kitchen; H, wood room; *a*, side entrance; *b*, kitchen closet; *c c*, closets, or else this space is used as winding front stairs.

No. 7 is a mechanic's cottage, with a good-sized living room in front, *a*; *b* is the hall, as also the same letter in plan a kitchen; *c*, bed room; *e*, pantry; *f*, rear passage both out and to pantry, cellar, and bed room. Second floor, two bed rooms and closets. Very many, requiring a house of this sort, having a small family, deem this plan or any similar one fully suited to their wants. Each room in the plan has a front window, and the whole, taken together, makes a comfortable and convenient house.



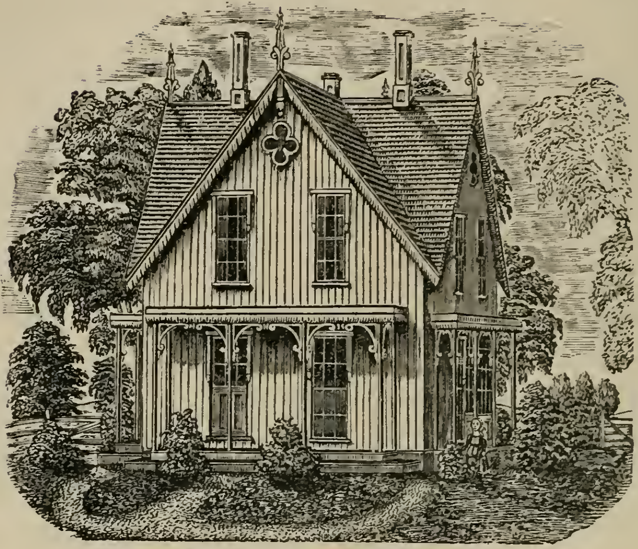
No. 7.

No. 8 is a larger plan in a square form. From the front we enter parlor, *c*, or the family, reception, and sitting room; *b* is the kitchen; *a*, bed room; *e*, pantry; cellar entrance from the kitchen; upper story, from front hall. This is a convenient mode of building when only a small house is wanted.

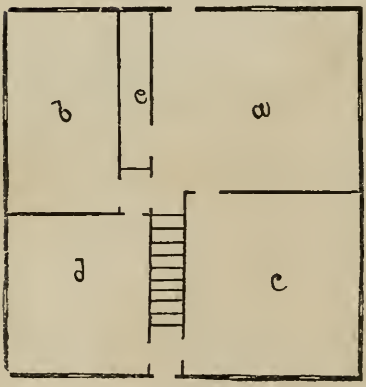


No. 8.

Upright No. 9 will give a tolerable idea how such a house may be made to appear. $1000 will build a very good house of this kind.



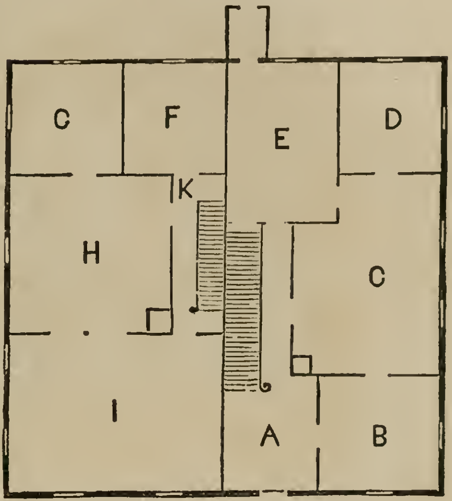
No. 9.



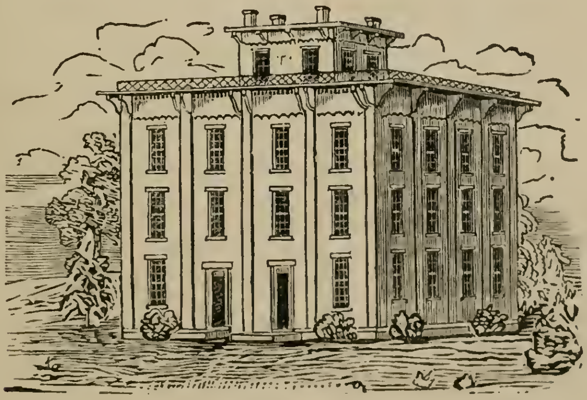
No. 10.

No. 10 is another method of making the rooms of a similar house. *c* and *d* are the front rooms ; *b*, a bed room ; *a*, kitchen ; *e*, pantry ; cellar, from kitchen ; up stairs, from front hall. *a* has a rear entrance, where a woodshed can be made. One chimney is sufficient for such a house as this, and the cost does not vary much from No. 8. Other divisions of a similarly formed house may be made, as the fancy or judgment may decide.

No. 11 is the first story of a double house. A is the front hall ; B, reception room ; C, dining room ; D, bed room ; E, kitchen, with an airy at rear entrance. No. 12. I is front parlor on second floor of No. 11, communicating with another parlor, H, and with hall, K. There are two bed rooms, F, G, on this floor, and four on a third. Each half is thus described, and an upright front view is seen in No. 13. Houses of this kind are quite common in some sections of the country; that is, houses with the parlors on the second floor. They are rooms but seldom used with many families, when there is a suitable room in which to receive temporary guests and ordinary and familiar callers. Size, 40 by 42 feet; cost, $5000.

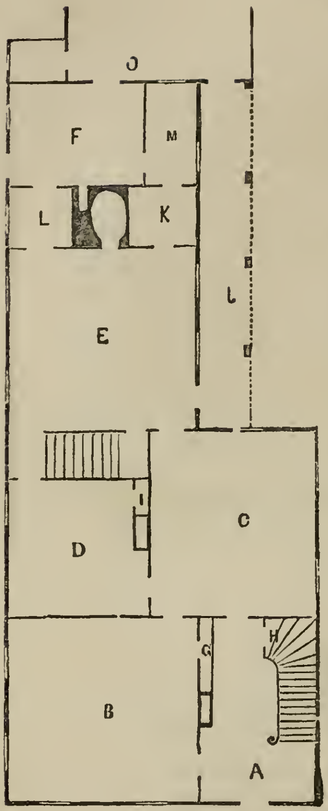


No. 12. No. 11.



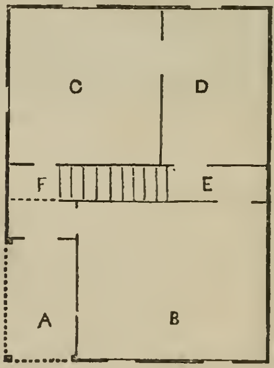
No. 13.

No. 14 is the plan of a house in Dudley, designed and erected by a young mechanic housebuilder. A, front hall; B, parlor; C, second parlor; D, bed room; E, kitchen; F, work room; G, closet; H, ditto; I, ditto; J, piazza; K, M, closet and pantry; O, wood room and water closet attached. From the kitchen there is



a pass to cellar and chambers. The second story is nearly the same, except a small room over the front hall, and ample closets to all the rooms. Estimated cost, $2300.

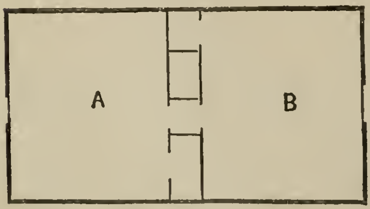
The size of most of the plans is not given to an exact measurement. Those using any of the plans will naturally make the size to their own liking. Size of rooms is generally given as of generous proportions.



No. 14.

No. 15.

No. 15 is a cottage in Worcester, built by a carpenter for $1000. A is a piazza entrance to the house; B, parlor; C, kitchen; D is a bed room; E, closet; F, spaceway from front hall and stairs.

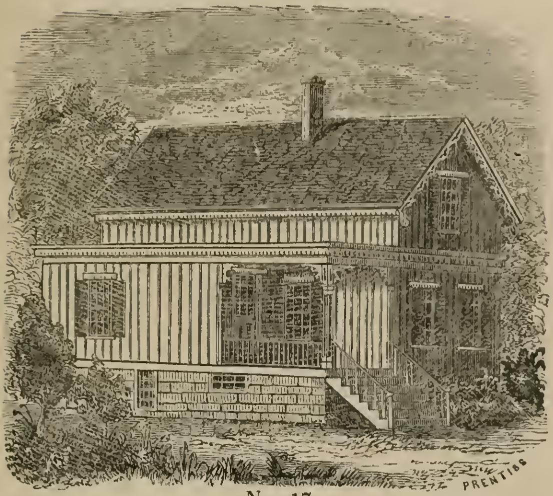


No. 16.

No. 16 is the second story, consisting of two bed rooms, A and B, with closets.

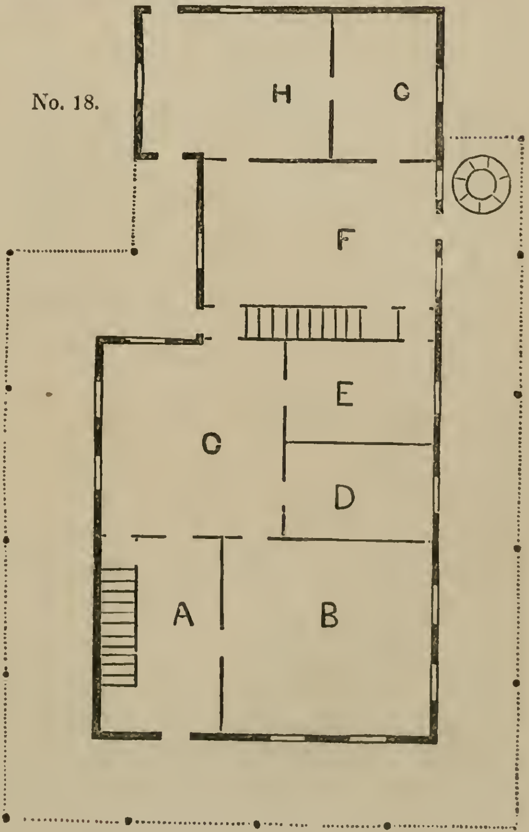
No. 17 is a raised view of the same.

No. 18 is a plan the author erected a few years since. It



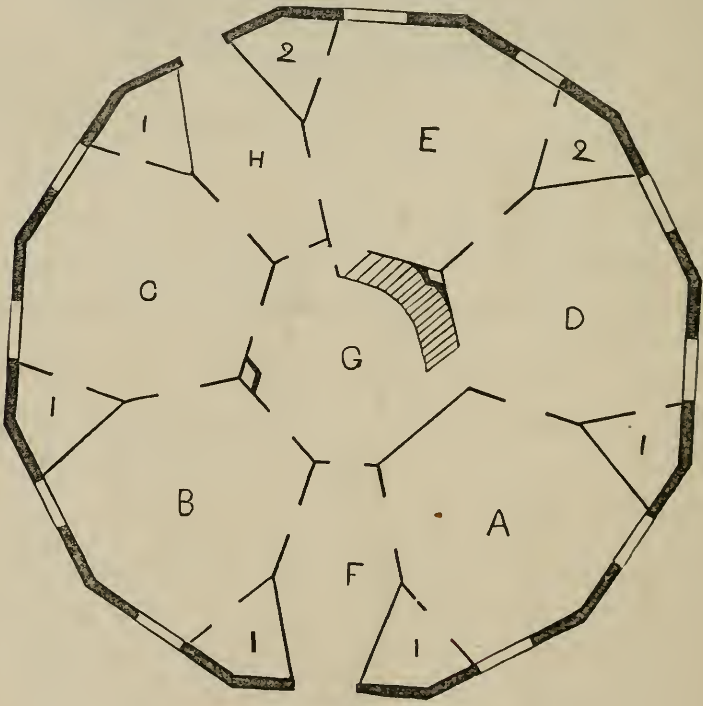
No. 17.

No. 18.



makes a very convenient plan for a country cottage. A the front hall, communicating with the parlor, B, second parlor, C, and rooms above, and a closet under the stairs. D, E, bed rooms, the latter communicating with dining room, F. G is a pantry; H a kitchen, which connects with a wood room and barn. The whole is surrounded by a piazza, terminating on one side at a well, and on the other the kitchen. Cost, $1800.

No. 19 is a twelve-sided, or dodecagon. F is the front hall entrance; A, parlor, with a closet, 1; D, dining room, with a china closet connected with the centre hall and the kitchen, E, which has two pantries, 2, 2, and connects with cellar, centre spaces, and rear hall, H. B and C are family bed rooms, having three closets, and easily connecting with the other portions of the house. The second story is of similar arrangement of rooms. Scale $\frac{1}{12}$ inch to foot; cost, $2500.

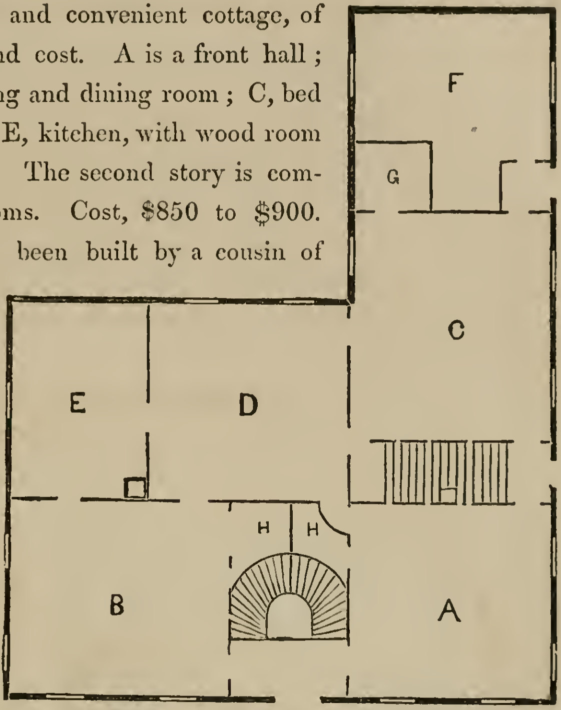


No. 19.

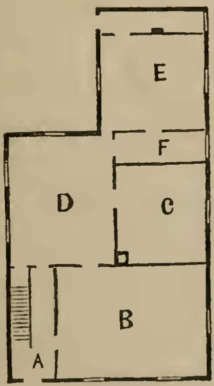
No. 20 is the plan of a house in Grafton, Mass. From the front hall, we pass into parlors, A and B, or rooms above. C is a dining room; D, kitchen; E, bed room; F, back kitchen; G, pantry. There are two side entrances, as seen in cut.

No. 21 is a neat and convenient cottage, of small dimensions and cost. A is a front hall; B, parlor; D, sitting and dining room; C, bed room; F, pantry; E, kitchen, with wood room and rear entrance. The second story is composed of three rooms. Cost, $850 to $900. This plan has just been built by a cousin of mine in Dudley, Mass.

No. 22 is the first floor plan of a large house divided as follows: From the front hall entrance we can pass into either the parlor, *a*, dining room, *d*, or second parlor *b*, used as a reception room, which has a rear room, *c*,



No. 20



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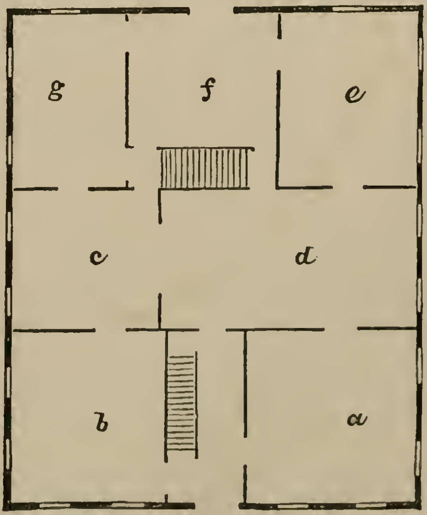
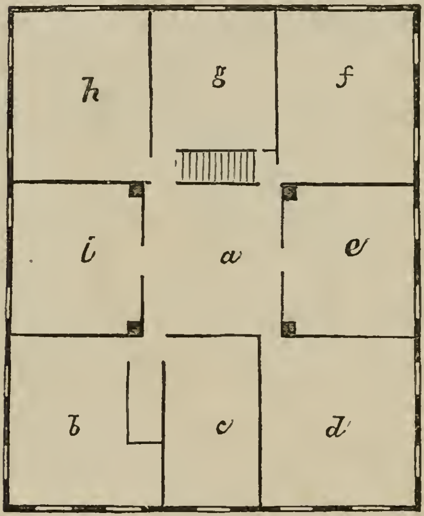


No. 22.

which, when required, can be thrown into the dining room, making a large hall; *f* and *g* are rooms allotted to the culinary department, and *e* is a bed room.

No. 23 is the second floor of the above. *a* is the landing space from either stairs; *b* and *c*, parlor bed rooms, comunicating with the rooms below, without entering the space common to all the rooms on this floor; *d* is a large front bed room; *e* and *i* are side bed rooms; *g* and *h* are store rooms, and *f* servants' room. Cost, $3000 to $4000, according to the style and method of finish.



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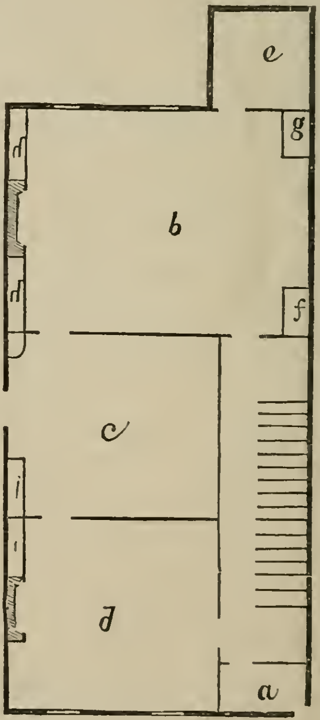
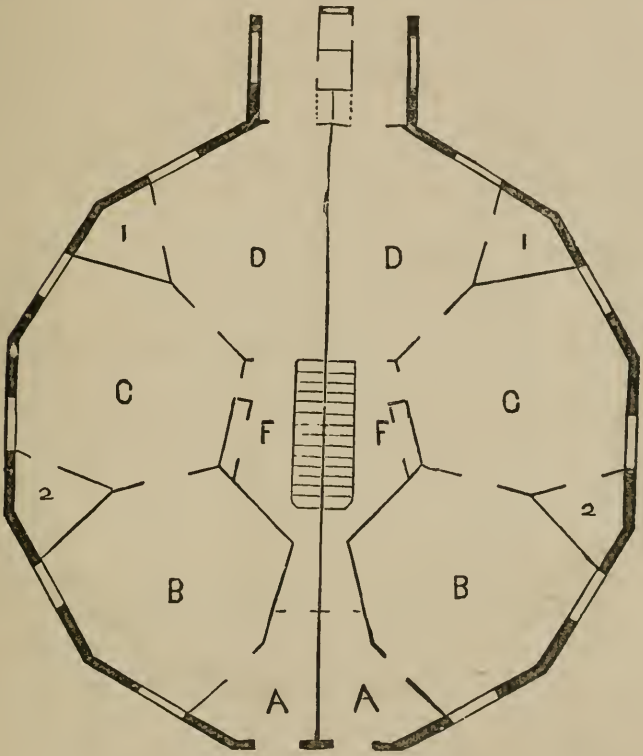


No. 24.

No. 24 is a plan of a city tenement, first story. *a* is the entrance, double on account of cold and other purposes. The first room on the left is a reception room; the next is a bed room for the family use; the next a dining room, with closets, &c., and an airy at rear passage. The basement story has a kitchen and servants' bed room, store rooms, &c. The second is the parlor story, sometimes with front and rear rooms over the hall. The third story has from three to five bed rooms. Cost, $3500 to $5000.

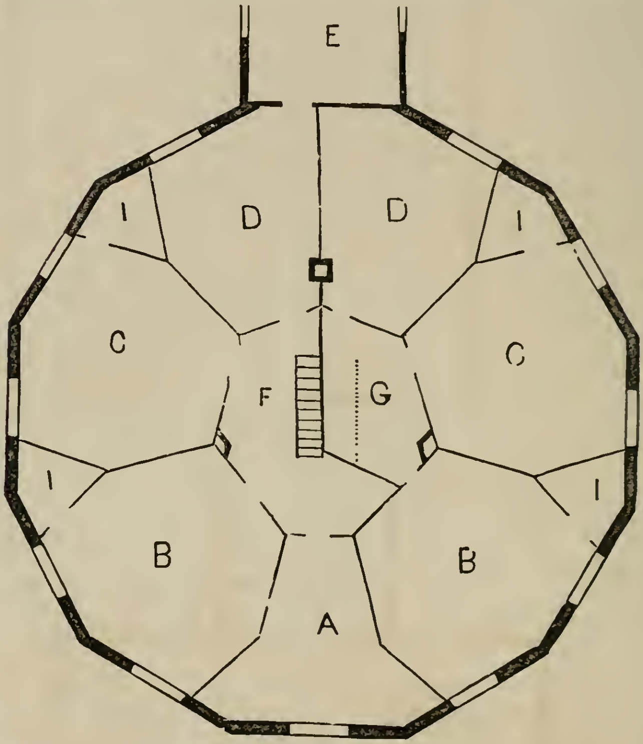
No. 25, (see Frontispiece,) the author's residence in Dudley, Mass.



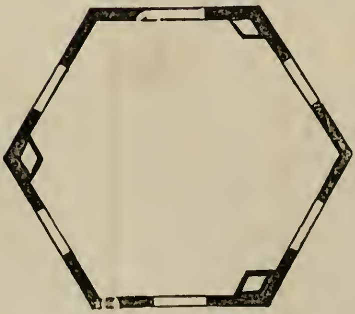
No. 26.

No. 26 is the first story of the same. This plan is a double house, or having two tenements. A A, front hall entrances; B B, parlors; C C, second parlors and dining rooms; D D, kitchens, with pantry and work rooms in rear, and rear passages, as also pantries, 1 1. F is passage way to all rooms below and above; cellar passages from kitchen; 2 2, closets; chimneys at the angle of parlors on F side. Parlor windows, unlike the design given in No. 25, are long, reaching to floor of two casements, 10 by 20 glass.

No. 27 is the second floor. A is a library; B B, parlor bed rooms; C C, second parlor ditto; D D, kitchen ditto; E, one of the rooms in the *ell;* F G, spaces or passages; 1 1, closets.



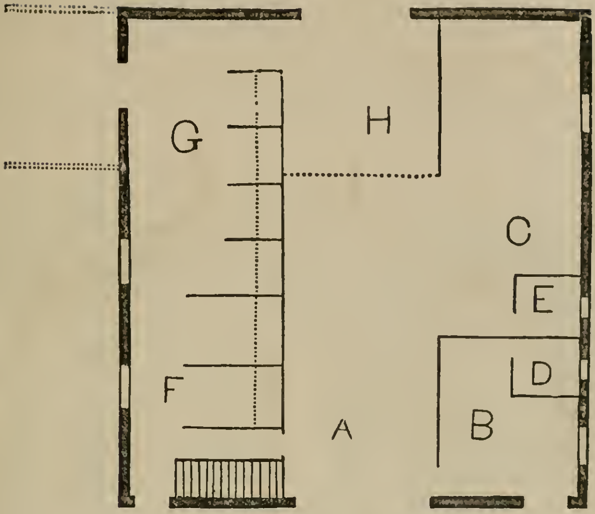
No. 27.



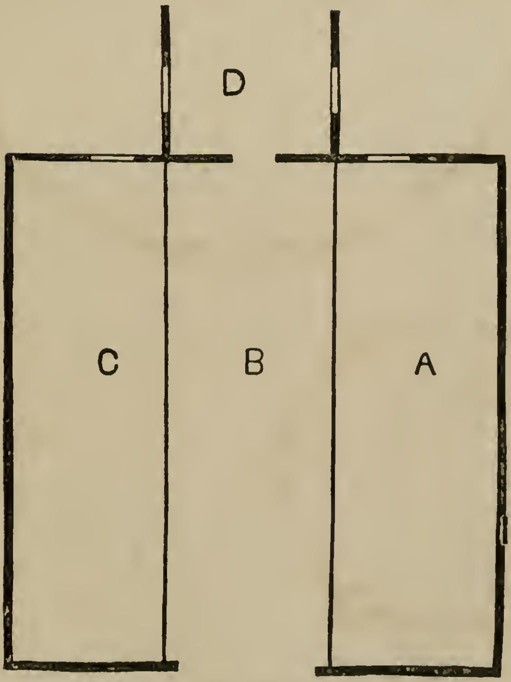
No. 28.

No. 28 is the observatory.

No. 29 is the first story of barn. A is carriage room; B, wood room; C, ditto and shop; D, E, water closets; F, horse stalls; C, cows' ditto; H, temporary ditto, with a passage way for carriage to pass underneath the drive way to floor above. From C is a communication with yard; underneath this is a cellar.

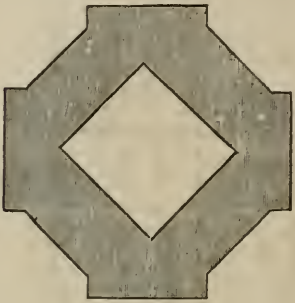


No. 29.

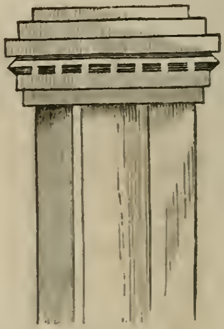


No. 30.

No. 30 is the barn proper. B, floor passage; A C, hay and fodder storage; D, granary, in part, adjoining the same, and connecting with the house. The stock is fed through floor. There is a passage for carriages from either side of the house, leading under D of this number.

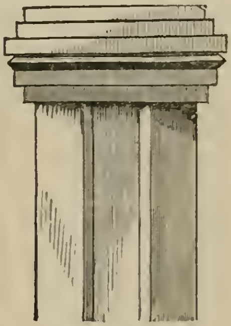


No. 31.



No. 32.

No. 31 is the chimney, showing a panelled octagon. Nos. 32 and 33 elevations.



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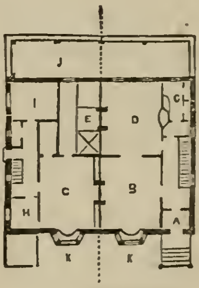
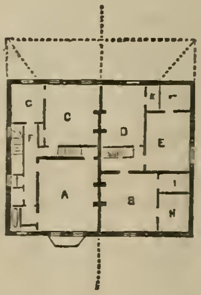


No. 34. No. 35.



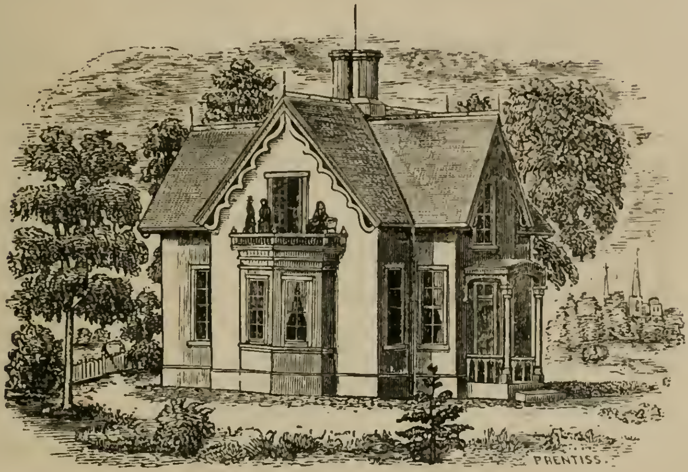
No. 36. No. 37.

No. 34 is the basement of a plan by Mr. Vaux. K is front; H, sink; C, kitchen, 14 by 17; E, coal, adjoining the furnace; I, provision cellar; J, veranda.

No. 35 is the principal floor. K, front; A, porch to hall entrance; B, parlor, 14 by 17; D, dining room, of the same size; C, pantry.

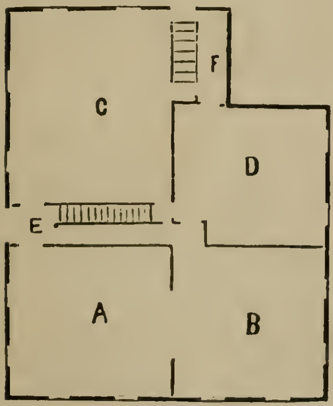
No. 36 is the second floor. A, front bed room, C, rear do.; small do. at head of stair landing, F, with closets.

No. 37 the attic. B, bed room; D, do.; E, do.; H I J and K, closets. Estimated cost of a double house of this kind, $5000.

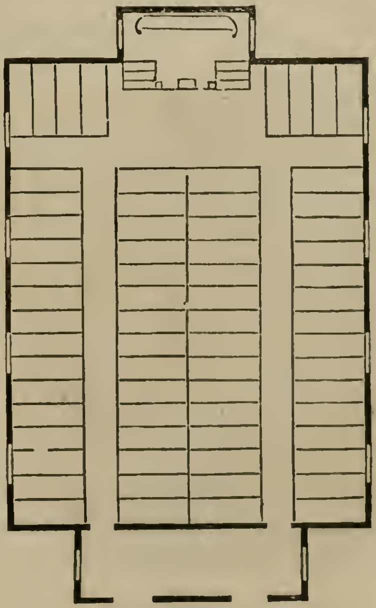


No. 38.

No. 38 is an upright of a neat cottage for a small family, answering to a variety of ground plans, of the cost of the next number, or any of the preceding of like dimensions.

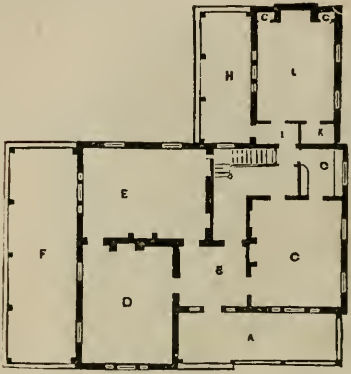


No. 39.



No. 40.

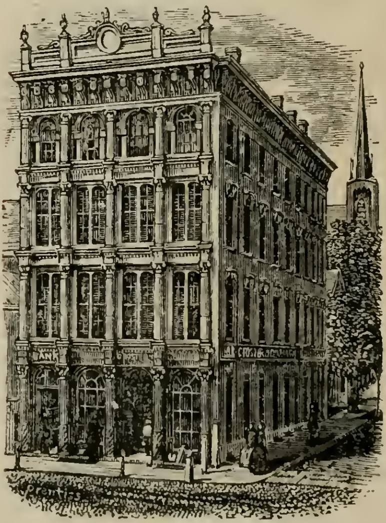
No. 39. A is the parlor; B, back do. or bed room; C, kitchen, or dining room; D, family bed room; E, hall and front stairs; F, pantry. This plan has a side and rear door, and in many cases will be found to answer a good purpose for a family on a small farm or in a country village.



No. 41.

No. 40 is a plan for a country meeting house, with an improved method of lighting the pulpit or speaker's stand without injury to the view from the hearers' seats, as would be the case if the window was directly back of the speaker.

No. 41 is a plan frequently built, or something nearly like it, and is considered a good one. A, veranda; B, hall; D, parlor; C, dining room; E, library; F and H, verandas; G, pantry; K, stores; I, rear hall. Cost of this plan, constructed by two stories, $4000.

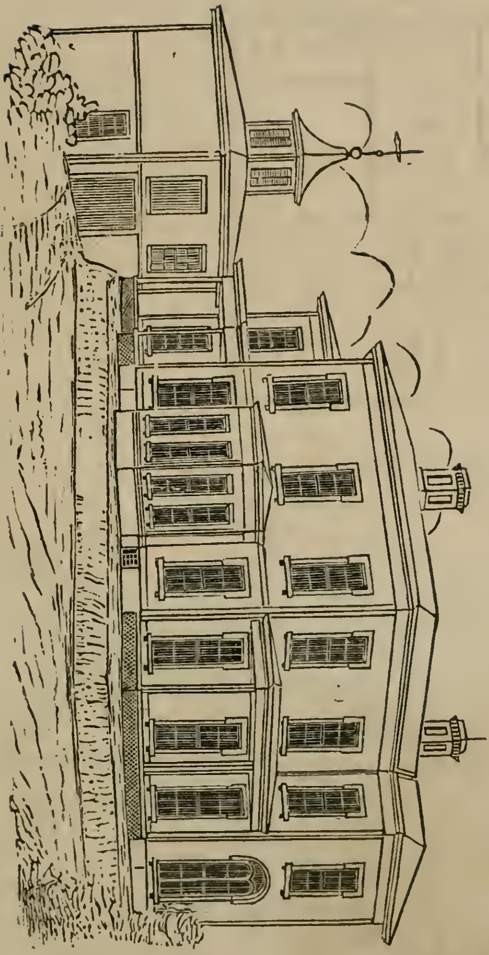


No. 42.

No. 42 is the plan of Messrs. C. Foster & Co.'s hardware store in Worcester, Mass.; it is also occupied by the City Bank. This is a remarkably classic, ornamental front, made of iron, and is probably not excelled by any structure of the kind in the country.

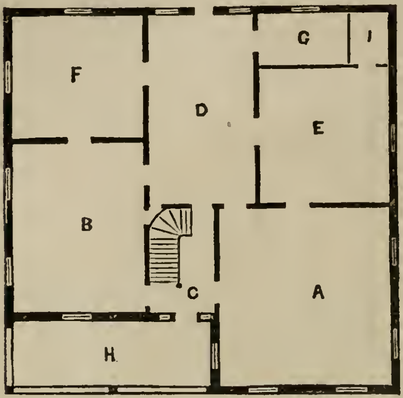
No. 43 is a view of Rev. Mr. Bent's boarding school in Worcester; the ground plans, which are thought to be very good, are given in a subsequent place.

No. 44 is a proposed plan of the author for a square cottage,



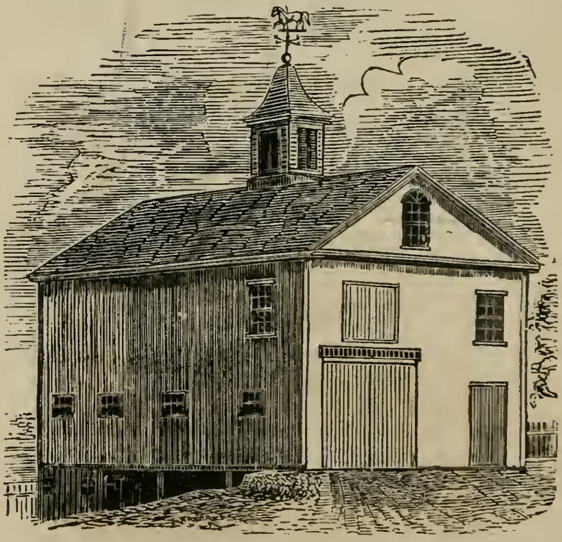
No. 43.

either for farm or village purposes. A is the parlor; B, the dining, sitting, and library room; C, the front hall, communicating with nearly all parts of the house, as is readily seen by the plan or cut given; D, kitchen, with a rear out door or wood room entrance; E and F, bed rooms, very conveniently located; G, pantry; H, veranda; I, closet to parlor bed room. For the second story divisions, four comfortable rooms can be made, with a hall space extending to the front of the house, where is a window to light the same, and making a good place for reading in warm weather; this hall connects with all the rooms on this floor. An upright of this plan is scarcely necessary, as its main features are so readily suggested.



No. 44.

No. 45 is an upright of a barn of modern style, having a ventilator, as all barns should, and rendered complete by Mr. A. Lyon's * emblematical weather vane.



No. 45.

No. 46 is a plan of a barn the author made for Mr. Ralph Robinson, Hampton, Connecticut, for a dairy stock of ten cows. A is the portion allotted to hay, called the bay, underneath which is

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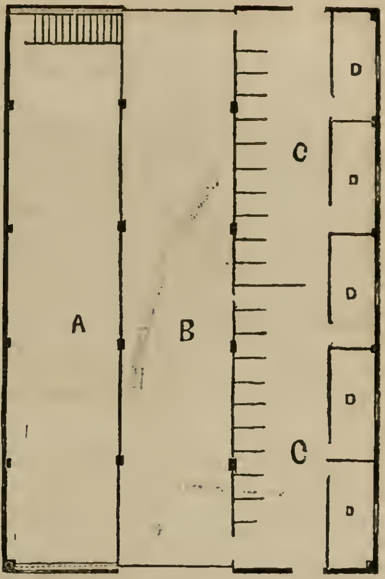
* Manufacturer of the excellent copper lightning rods, and a great variety of weather vanes, compass marks, &c.

the root cellar and storage fodder, connected with floor passage, B, by stairs as given in the cut. C C, stalls; D D D D D, stalls for cows at time of dropping calves, and the use of the latter thereafter as occasion requires. Underneath B C C is the cellar for manure, which is dropped beneath D D, which latter is raised to admit this plan, and thus we avoid the common scuttle, which has often proved dangerous to cattle. This, or some similar plan, will be found convenient for all barns.

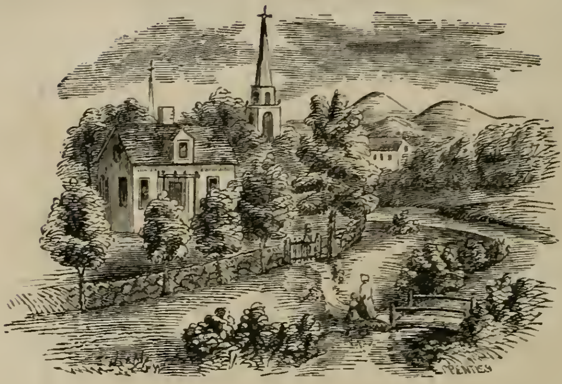


No. 46.

No. 47 is a picturesque view of residences by the side of water,

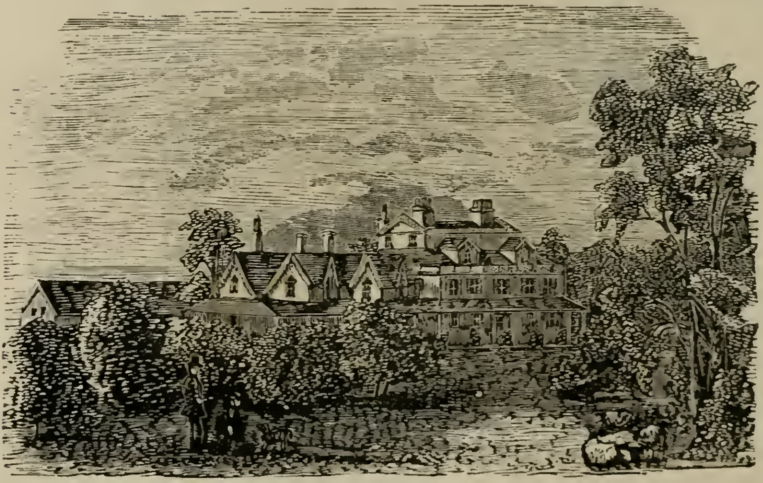
No. 47.

situations extremely desirable to some persons; and now that artificial fish feeding is found to be a source of profit, more persons will select like points for houses.



No. 48.

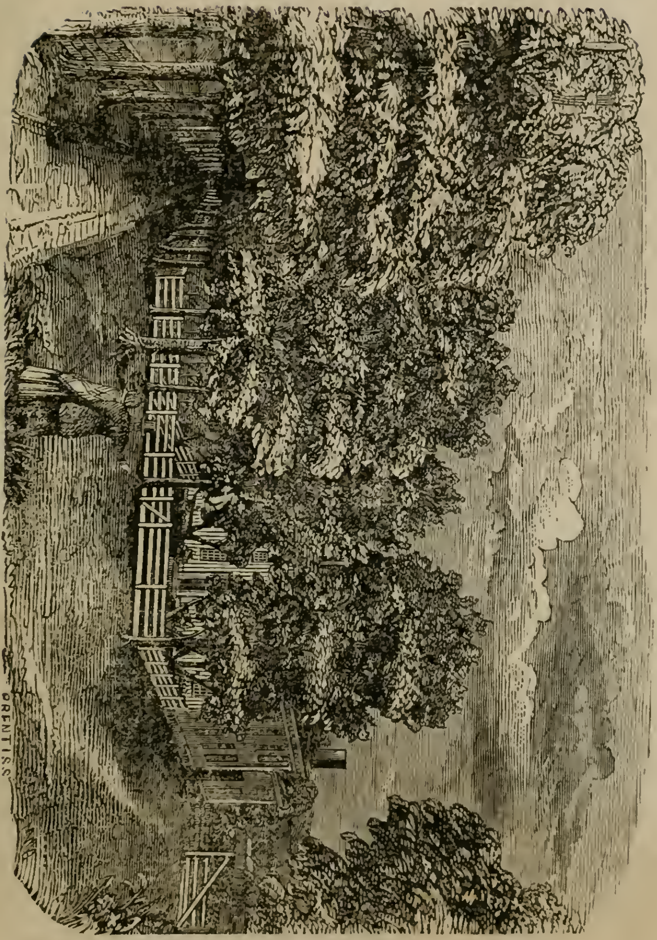
No. 48 is a view unlike the preceding, and both, with the two that follow, are given in illustration of the views given in the Introduction.



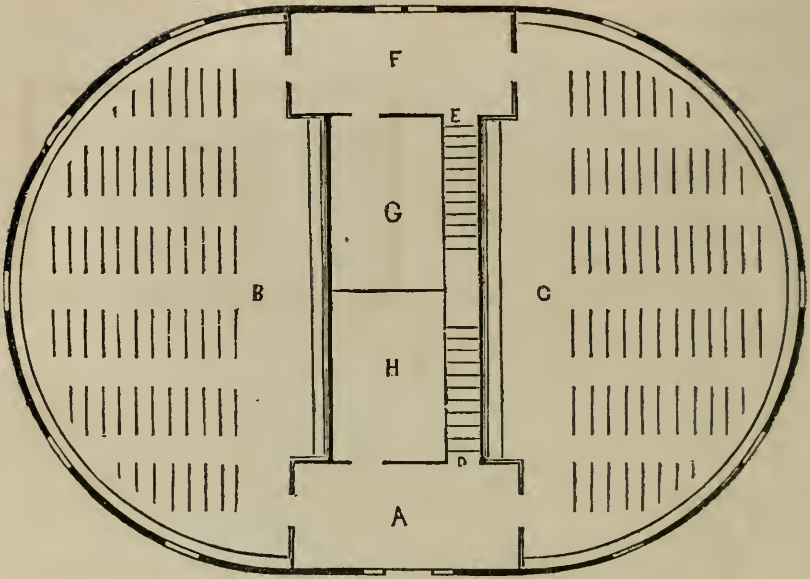
No. 49.

No. 49 is the late Hon. Daniel Webster's homestead, Marshfield, Massachusetts.

No. 50.



No. 50 is the residence of Cornell Monroe, late Plainfield, Conn., a view taken on the spot, and shows what a little care with trees will do to beautify a house.

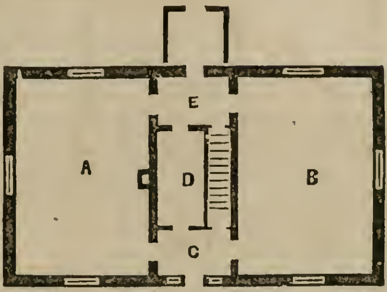


No. 51.

No. 51 is a proposed plan of a school house, by the author, for the use of such large towns as, by their condensed population, are enabled to unite a large number of pupils of all grades, and therefore secure the advantages of classification. A is the front hall entrance, communicating with either school room below, the clothes room or store room, as may be wanted, and the rooms above. B and C are the school rooms of this floor. These rooms, besides the convenient arrangement of seats for the pupils, have bench seats on the entire circle, and the same in rear at teachers' stands, back of or within B and C. The second floor arrangements for the advanced classes or higher department is still further improved by the use of the space over the halls for recitation rooms; otherwise the two stories may be considered nearly alike. A plan of nearly this form, for a single school room, can be made superior to the forms now in use.

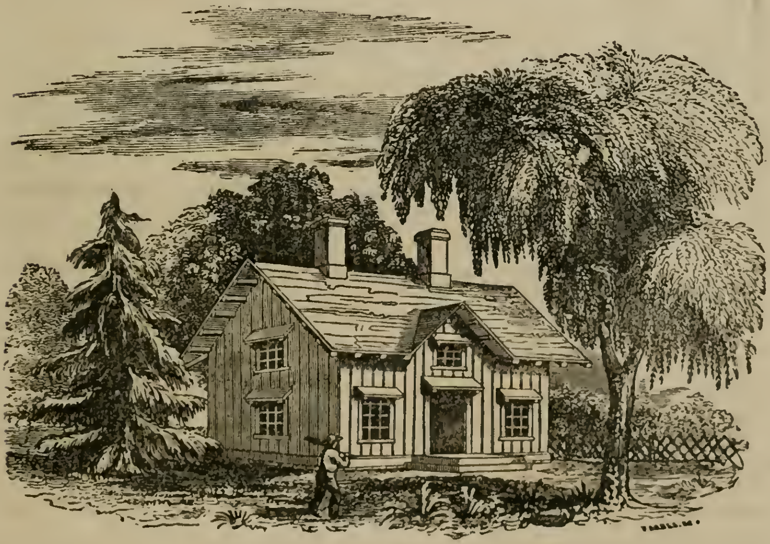
No. 52 is a plan of a very cheap cottage, adapted to places and parties of extreme limits and requirements.

No. 53 is an upright of the same, or any similar one.

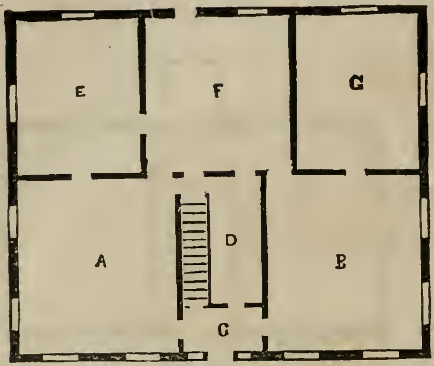


No. 52.

No. 54 is a plan of the author for the use of moderate sized families, or a farm residence. A is the family or living room, or a second parlor, connecting with cellar, front hall, back kitchen, F, and with room E, which may be used as a bed room or stores. C is front hall ; B, the parlor ; G, bed room ; D, special closet or pass to kitchen, F ; and from the latter may be constructed a small projection, as wood or summer kitchen, with store room, of width so as just to exclude windows in main part. The upper story is so readily suggested, a view need not be given. Chimney at inner corners. E G.

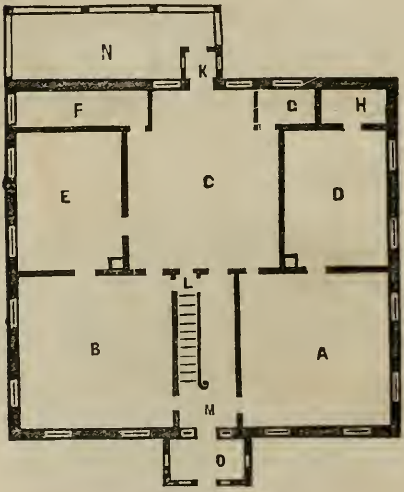


No. 53.

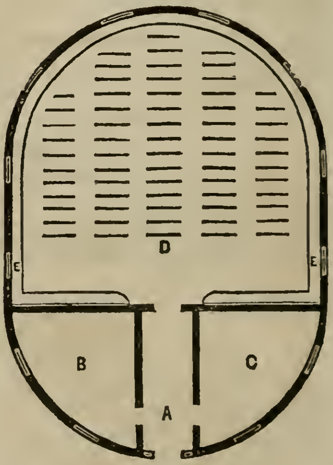


No. 54.

No. 55, "Family Mansion," represented in No. 56, frontispiece to this volume. A, parlor; B, second parlor; C, kitchen; D, bed room; E, do. or stores; F, pantry; G, china closet; H, closet; K, airy; M, front hall; N, veranda; O, front portico.

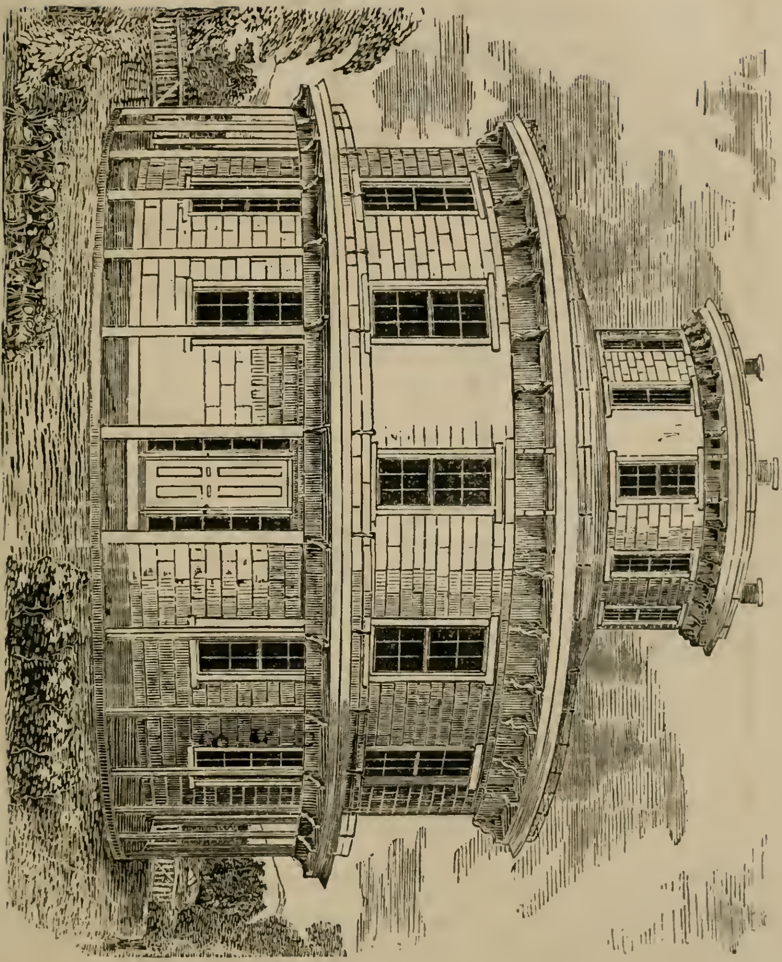


No. 55.



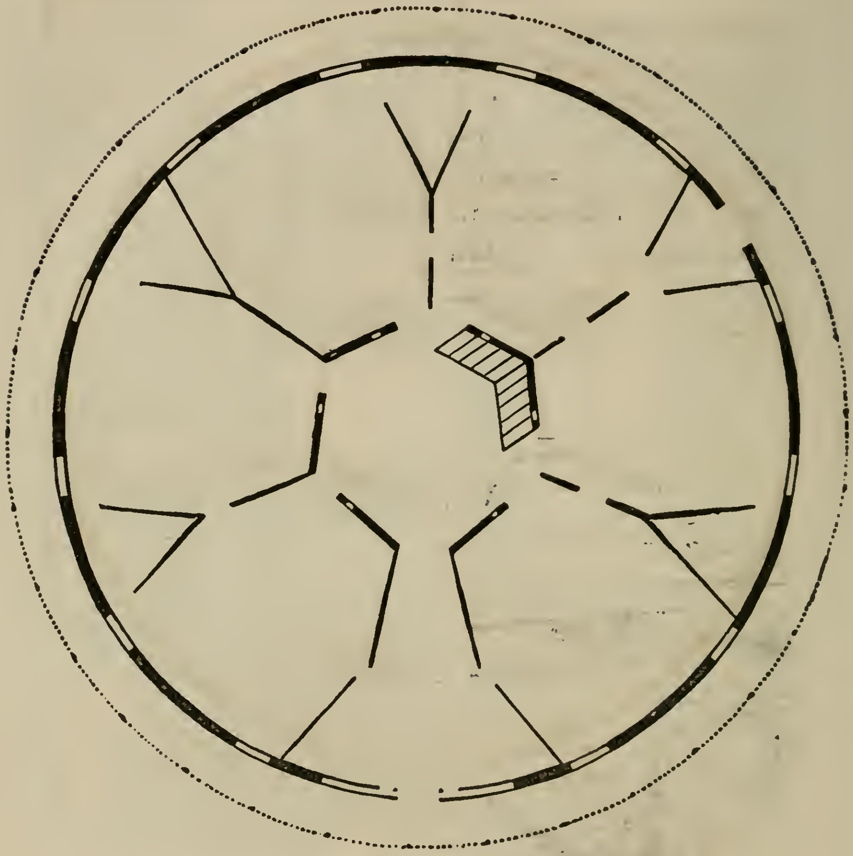
No. 57.

No. 57 is another oval plan of a school house for the country, very convenient and of easy construction of brick or stone. A, entrance; B and C side rooms for the use of the scholars, one side for boys, the other for girls; D, school room, surrounded with a seat, E E. The author gives these plans in the belief that they will be found better adapted to the purpose than any heretofore published.



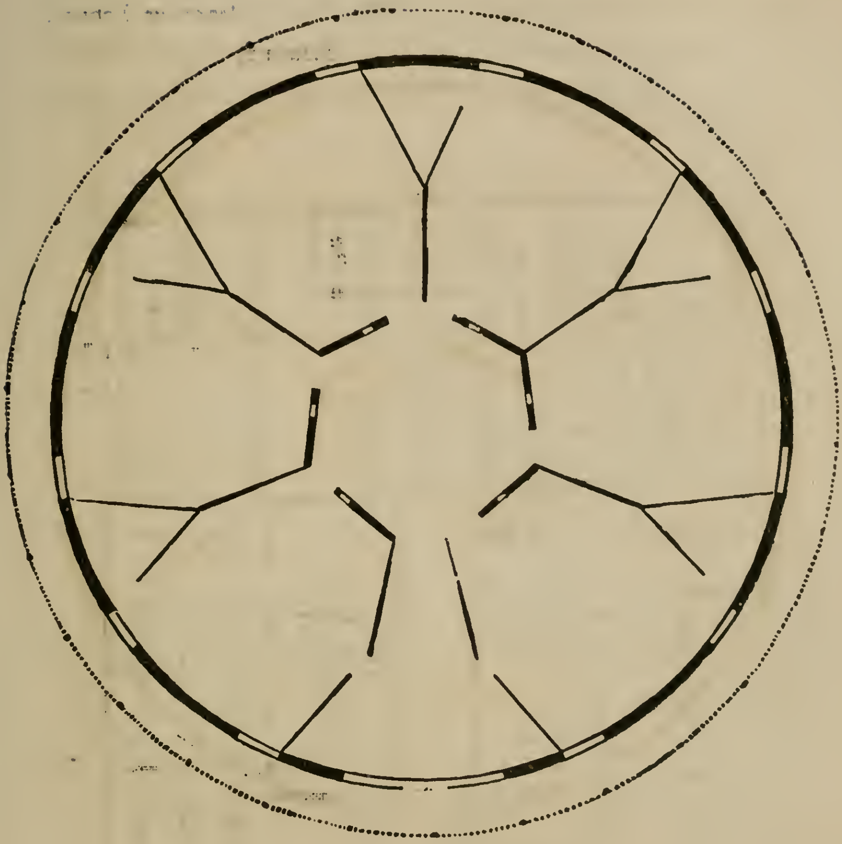
No. 58.

Above, No. 58, is a proposed house by the author, for Mr. Drew, of the Worcester Spy. It shows what special advantages there may be in the circular form for a house.



No. 59.

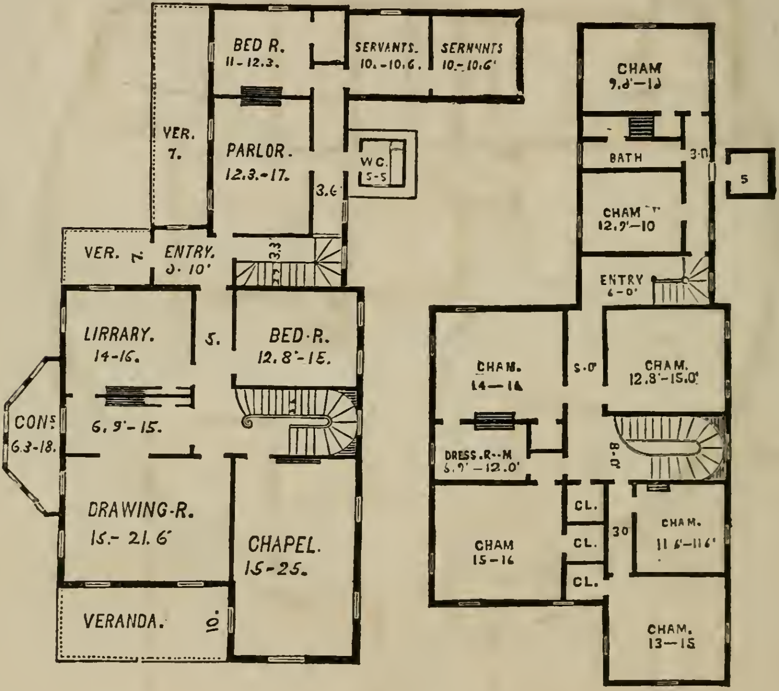
No 59 is the first floor to No. 58. On the right are parlor, second parlor, and kitchen; on the left are rooms for family use.



No. 60.

This is the second story of preceding, divided in a manner conformable to the first story. The uses of the several rooms are readily suggested to the reader.

No. 61 is the first story plan of Mr. Bent's Boarding School, recently erected on a prominent situation, Salisbury street, Worcester, Mass. The rooms are all marked, so as to need no further explanation.



No. 61.

No. 62.

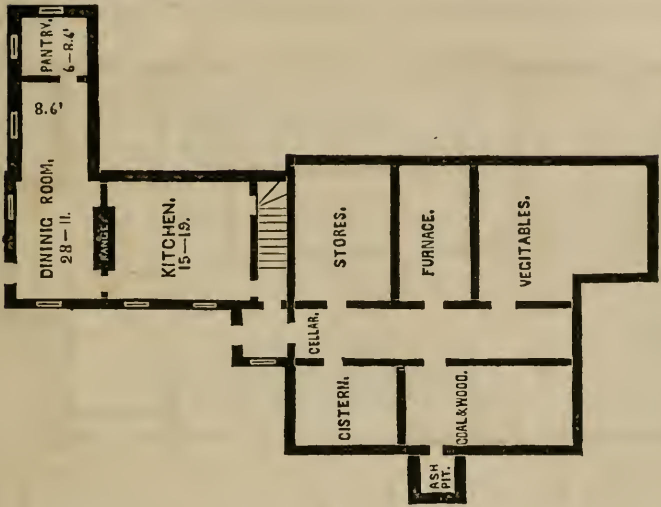
No. 62 is the second story of same.

No. 63 is basement story, likewise marked. The front elevation is given on a preceding page.

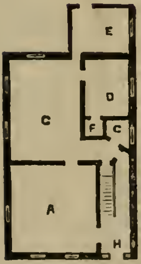
No. 64 is a plan of a small, convenient dwelling, of cheap construction. A, living room; C, common do.; D, bed room; E, back room; F, closet; G, pantry; H, front hall.

No. 65 is a cottage, very convenient, and of a cost of about

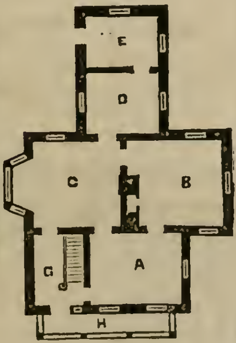
$800. A, parlor; B, bed room; C, kitchen; D, back do.; E, stores. It has a veranda in front, and a second story of three rooms.



No. 63.



No. 64.



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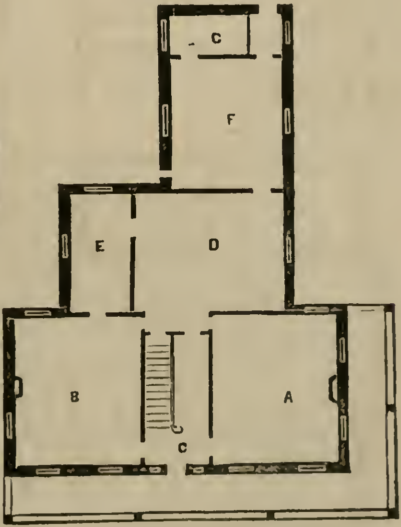
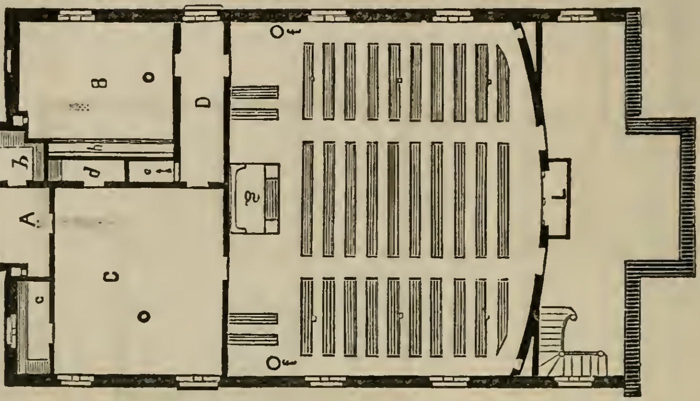


No. 66.

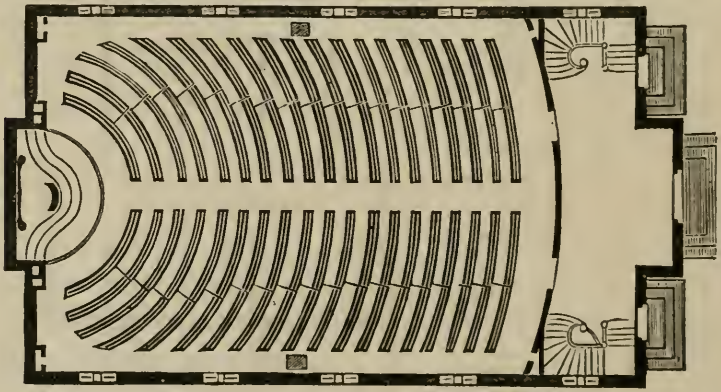
No. 66 is a plan for Sunnyside residence, (see plate fronting plans to this work.) A, parlor; B, second parlor or living room; C, front hall; D, dining room or kitchen; E, small bed room or store room; F, kitchen, with pantry and rear passage. This plan has the piazza front, and five chamber rooms.

No. 67 is the ground plan of the new Congregational Church, Thompson, Conn., provided with a kitchen, A, pastor's study, B,



No. 67

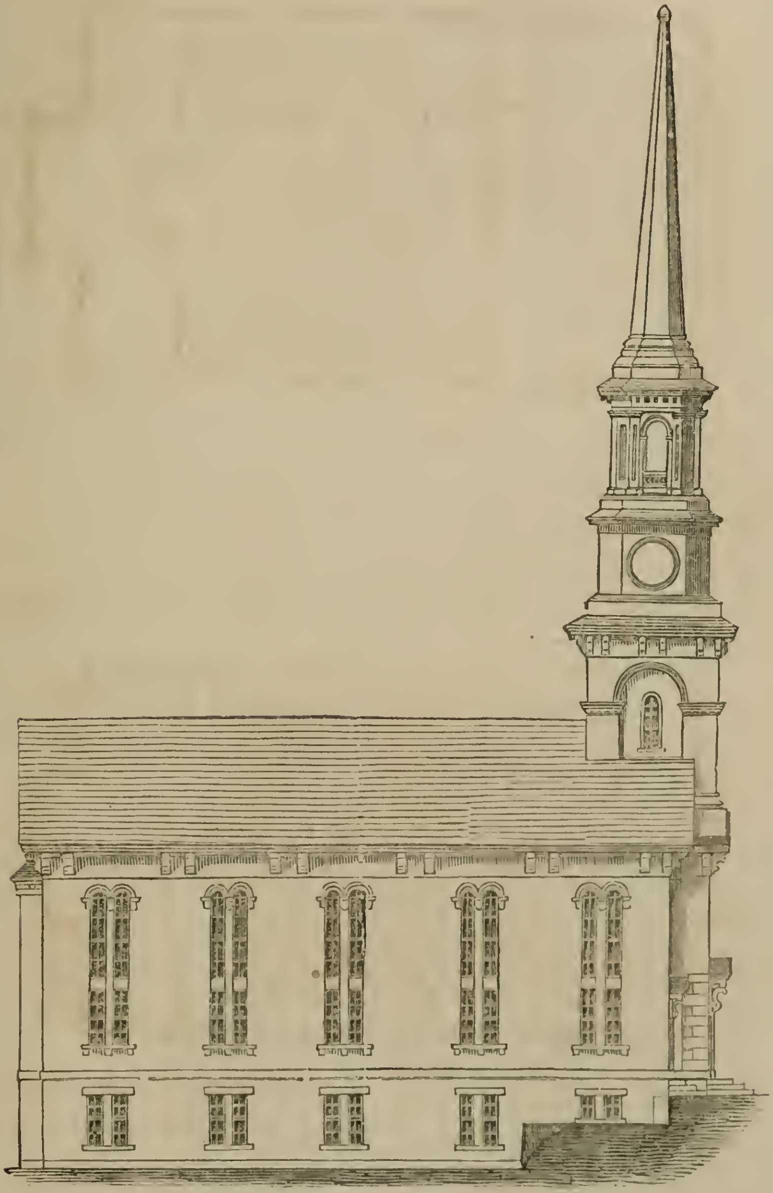
with ample library cases and conveniences of personal comfort scarcely equalled. C is a room for ladies' industrial circles and society purposes, with kitchen, china closets, &c. This is the vestry lecture room, and is provided with furnaces for warming the church. The ground or floor plan is given in No. 68. Nos. 69 and 70, front



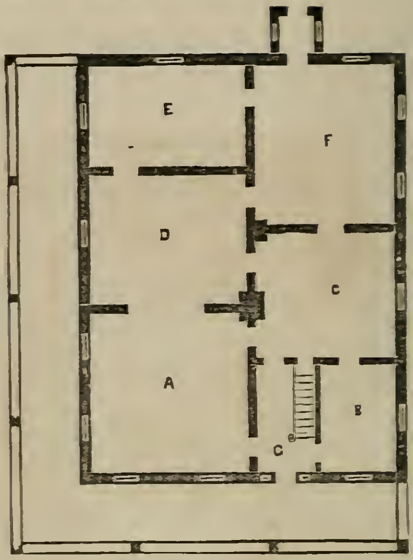
No. 68.

and side elevations. Cost of whole, $15,000. Towle & Foster, Architects, Boston, Mass. Stratton & Bishop, contractors and builders, New Haven, Conn.

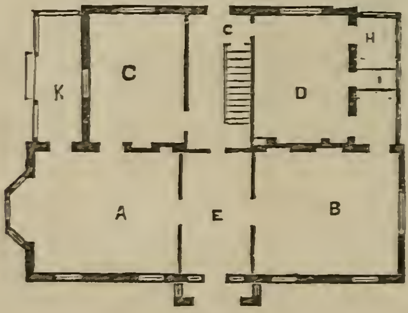
No. 71 is a convenient plan of farm house or family mansion. A, parlor; B, small reception room; C, dining room; D, rear par-



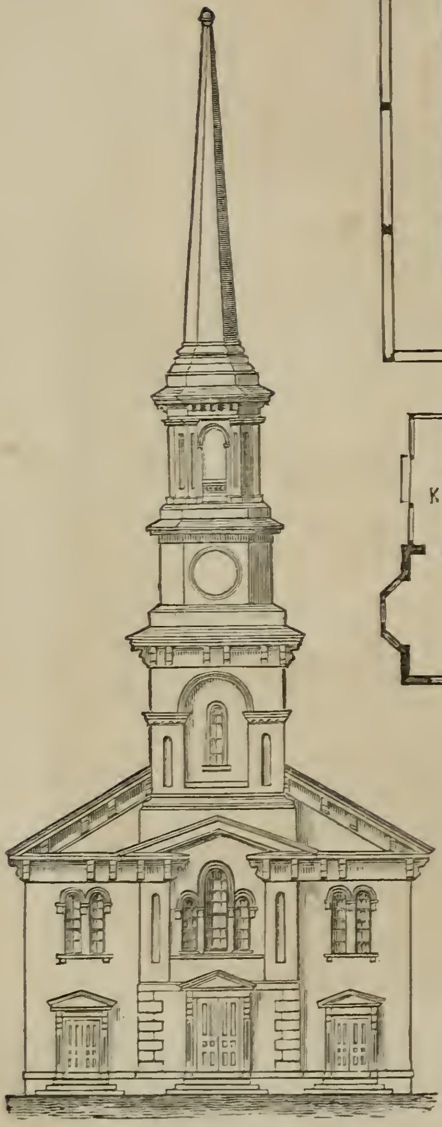
No. 69



No. 71.



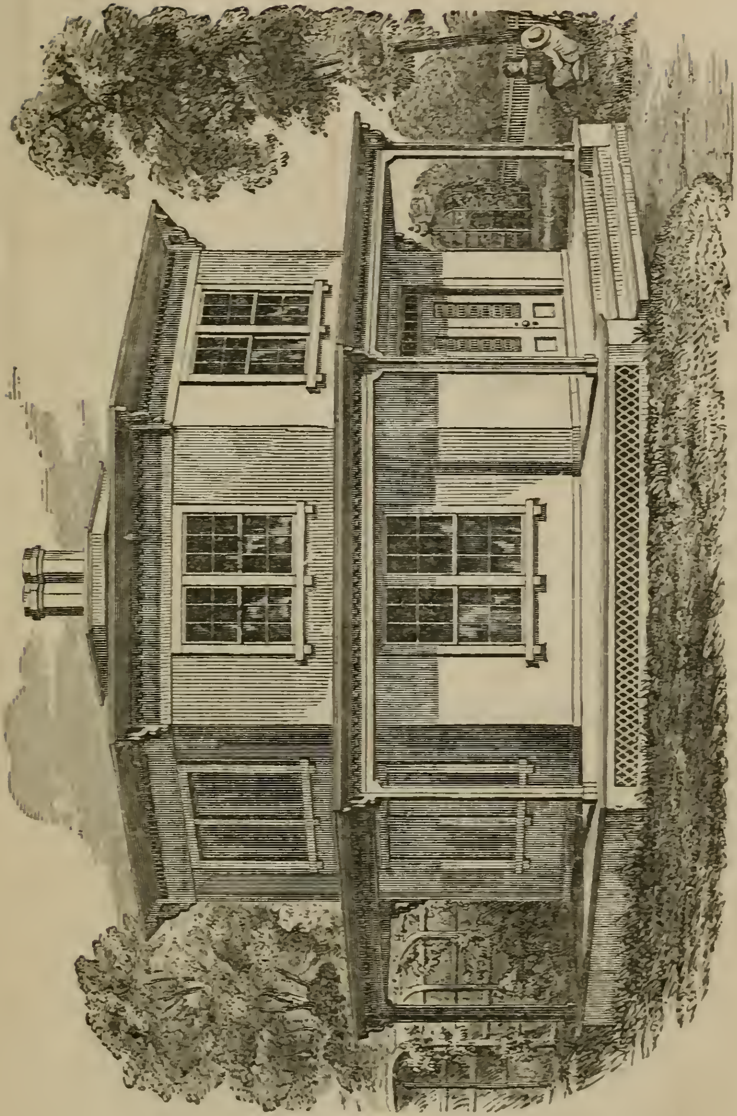
No. 72.



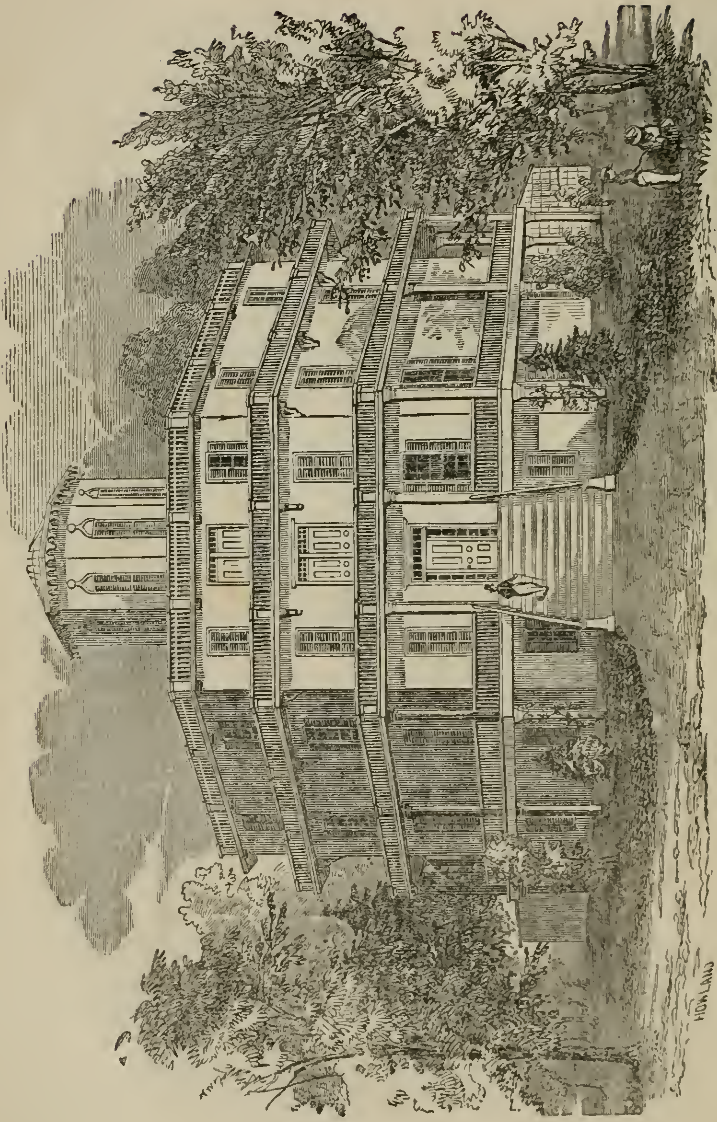
No. 70.

lor; E, bed room; F, kitchen; G, front hall, with piazza on two sides, and airy at rear entrance.

No. 72 is a plan often built, or those nearly allied to it. There are two front rooms, with open hall between them; kitchen, D, with pantry, closets, and a bed room, C; veranda, K.

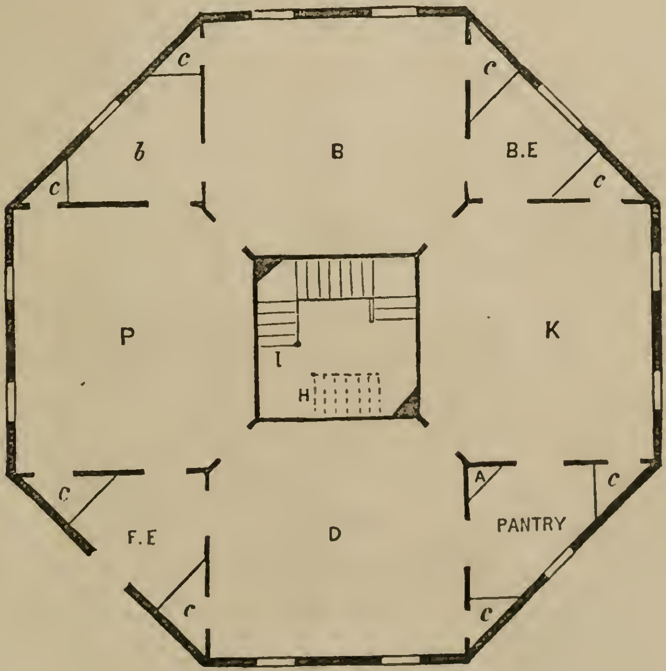


No. 74.



No. 79.

The two following plans, Nos. 73 and 75, the author is permitted to give by Messrs. Fowlers & Wells, publishers of the Fowlers' "Home for All." The second is that used by Mr. F. in his mansion at Fishkill, on the Hudson. Mr. F. constructed his house with the gravel or concrete wall; and in his book he has given ample details of that method of constructing the walls of houses. It may do well where the right kind of material is abundant; yet, as a general practice, frame houses with wood covers, (for the present at least,) will be most used, both on account of the plentiful supply of timber, and the dryness of such houses — a very desirable thing in all residences for man or animals, except such as burrow in the earth.



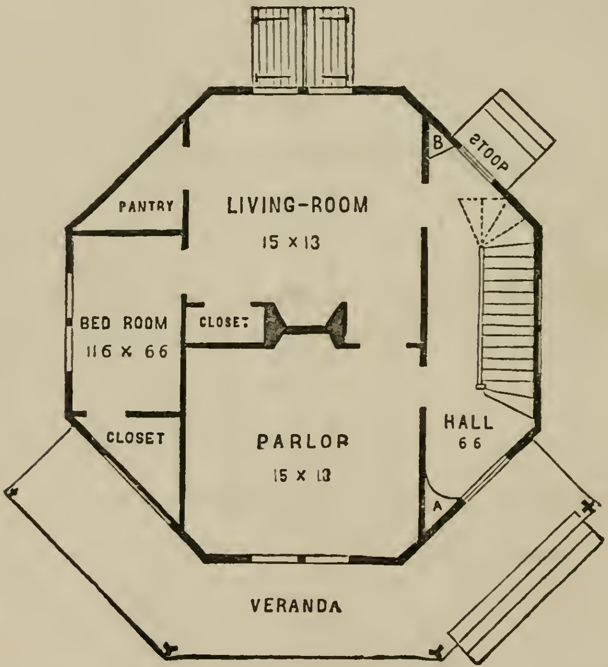
No. 73.

Mr. Fowler earnestly labors to show the cheapness of the gravel wall, and probably with truth; but it is yet needing further tests to establish it as a strong and durable method of building. The reader is specially referred to his volume as containing many valuable hints for those about providing themselves with a house.

The preceding is also from the same source.

No. 73. P is parlor; D, dining room; K, kitchen; B, bedroom; B E, back entry; E C, front entry; A, dumb waiter; B and C C C, closets.

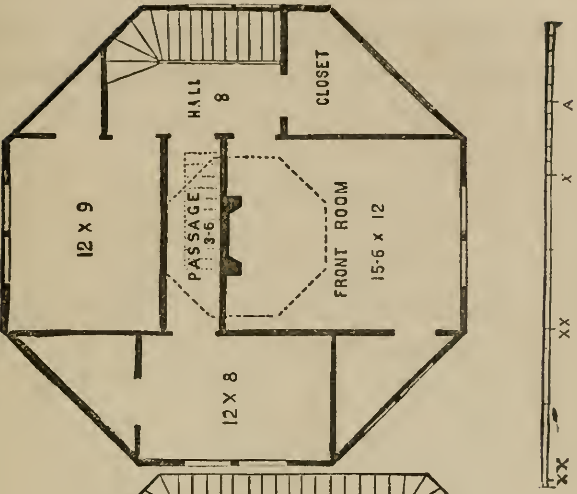
No. 74. Upright of house in Williamsburg. No. 75, first story. No. 76, second story. Cost, $1200.



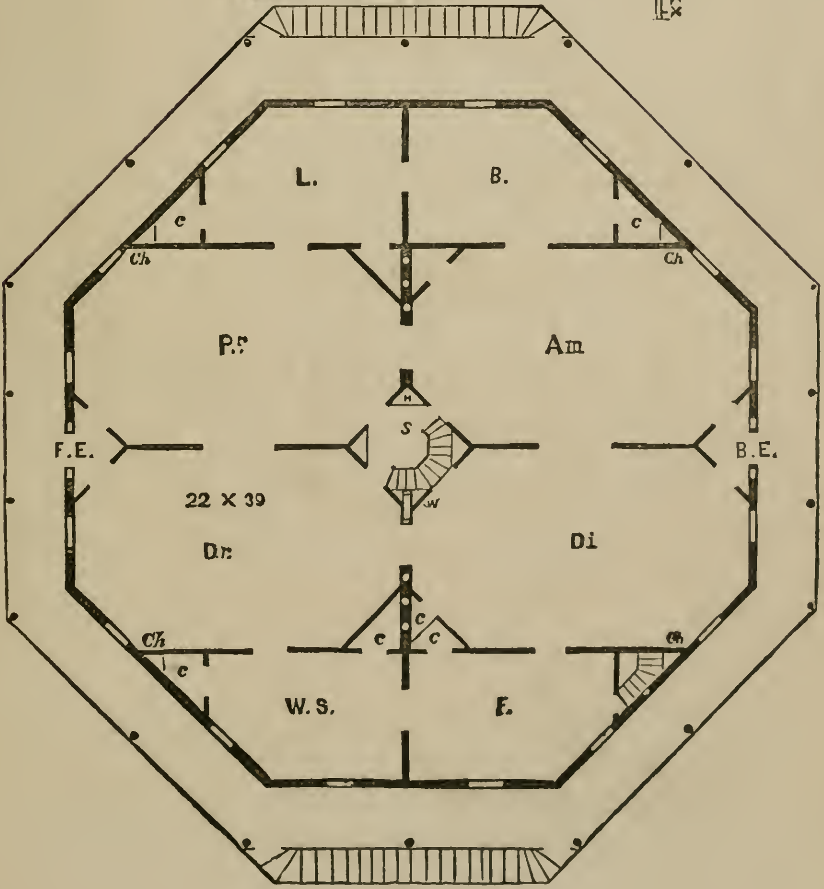
No. 75.

No. 77 is the first story of Mr. Fowler's house.

No. 78 is the basement story, amply provided, as will be seen by the plan, with all the appurtenances of a "work" story, as he terms

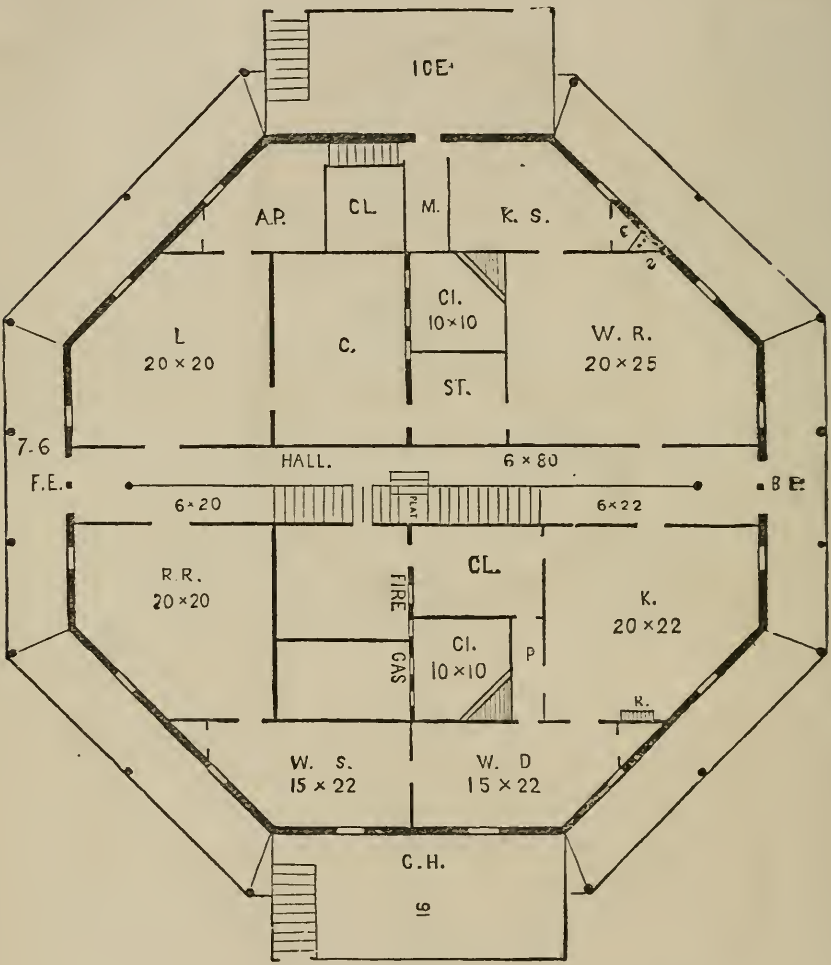

HALL 8
CLOSET
12 x 9
PASSAGE 3-6
FRONT ROOM 15-6 x 12
12 X 8

No. 76.


L.
B.
c
c
Ch
Ch
P.r
Am
S
F.E.
B.E.
22 X 39
W
Dr
Di
Ch
c
c
c
c
Ch
W.S.
F.

No. 77.

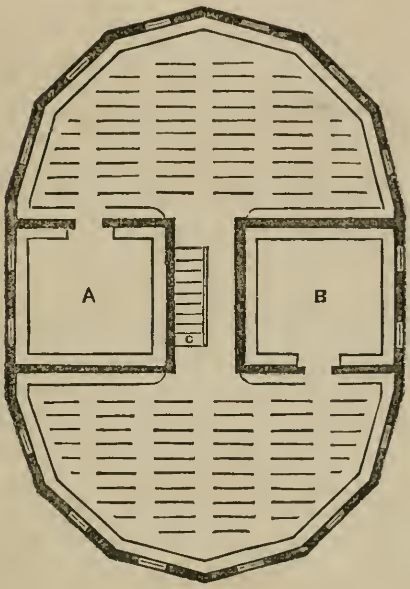
it. This story is nearly all above ground, and as the rooms are so clearly marked on the cut a further notice need not be given.



No. 78.

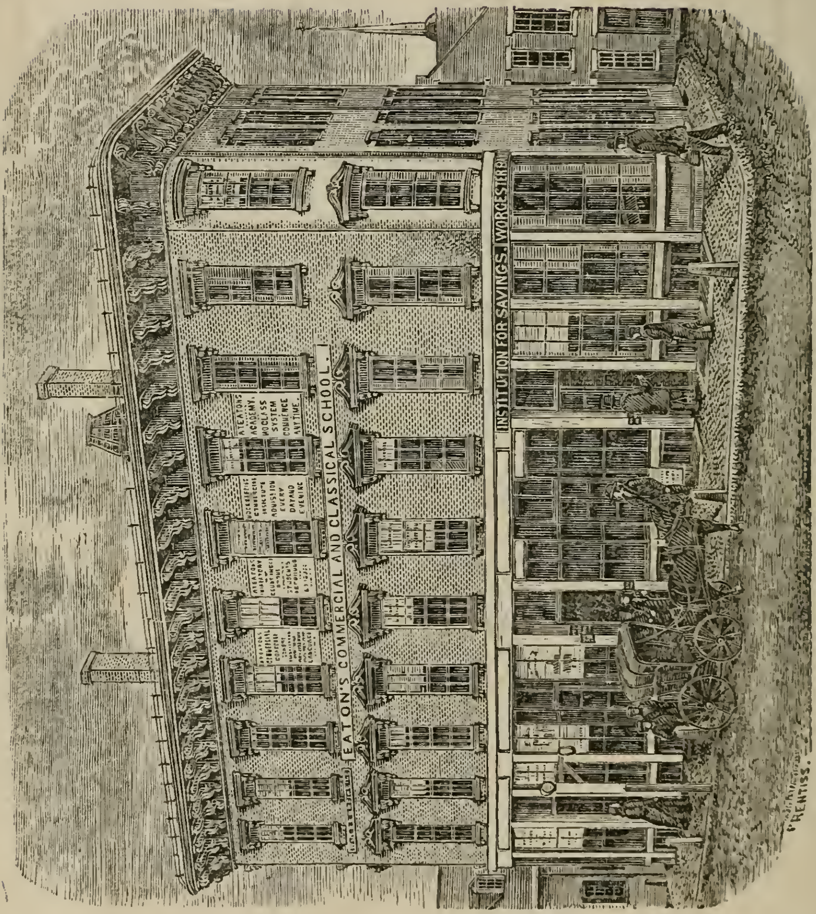
No. 79 is an upright of same; the whole is of four stories. Mr. Fowler has not given full cost yet.

No. 80 is another plan of a school house, to be made of wood and a frame. This is the second floor; the first is so readily suggested as not to need further notice. There are two rooms on this floor, one for each department; the size is 60 feet by 40. Cost, $4,000.



No. 80.

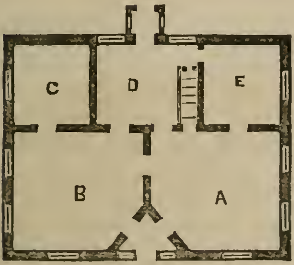
The special advantages of school rooms of this form are at once seen by all who have had much occasion to use them, and the cost on the whole is less, when the same amount of space is inclosed. The whole is surmounted with an observatory, which makes a complete ventilator to the building.


INSTITUTION FOR SAVINGS. WORCESTER.
EATON'S COMMERCIAL AND CLASSICAL SCHOOL.
AT EATON'S ACADEMY. NO CLASS SYSTEM COMMENCE ANY TIME.
ADMISSION EVERY DAY AND EVENING
PRENTISS.

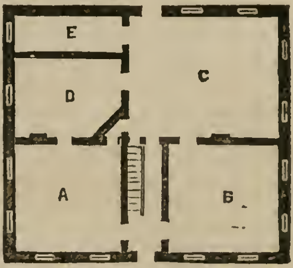
No. 81.

No. 81 is the Bank Block Building, Worcester, a fine specimen of its kind, occupied in its upper stories by Mr. Eaton for his school.

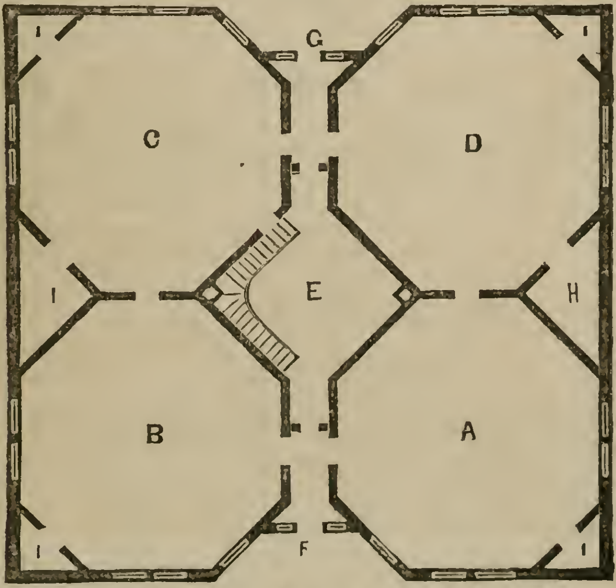
No. 82 is a proposed plan for a very cheap cottage, or prairie lodge for a small family, having two rooms in front, A and B, with a small space for entrance, in preference to having the doors open directly into the rooms from without, as is too frequently the case in the Western States. There are two bedrooms, C and E, and a store and passage room, D, and space above for stores.



No. 82.



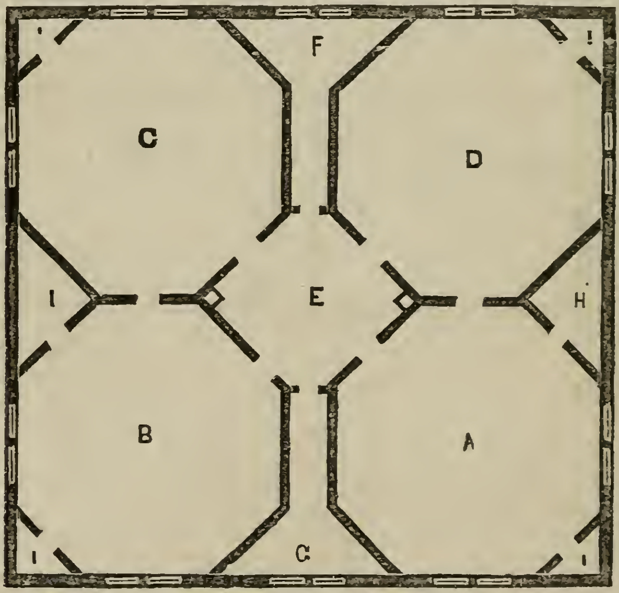
No. 83.



No. 84.

No. 83 is a better style for a small cottage, having a parlor, A, living room, B, kitchen, C, with pantry, E, and bedroom, D. $400 to $600 will build good houses of these plans, and still less sums when greater economy is desired.

No. 84 is a proposed square house with the rooms octagon, a style that may suit the fancy of some parties. A and D may be used as parlors, or A and B, with C for kitchen, and D family bedroom; F and G front and rear entrances, E the space in the centre, where are the stairs, which can be made double with a common landing. The closets are sufficiently indicated, as also the chimneys.

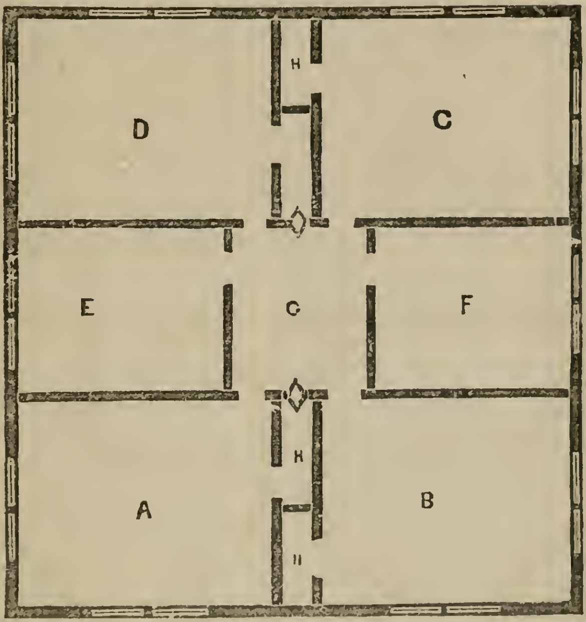


No. 85.

No. 85 is the first second floor plan.

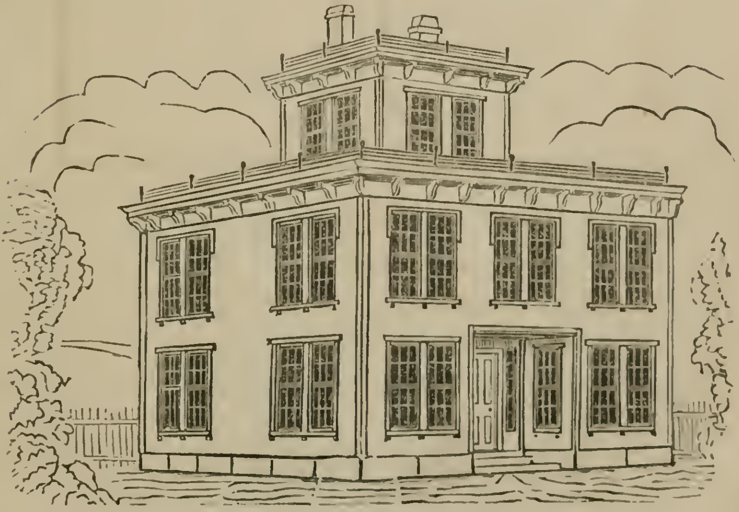
No. 86 is the second proposed plan that may be desired by a great number, who yet, for the novelty of the first story, would like so much in that form. In practice these lower rooms would be found very convenient.

In No. 87 is given the front elevation of these plans in outline, yet with sufficient definiteness to enable any ordinary mechanic to go on with the plan. It would make a very neat house, and it will



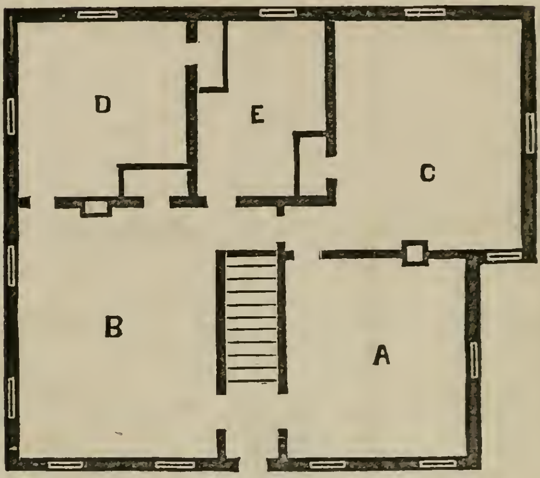
No. 86.

with others of like character prove a complete refutation to the



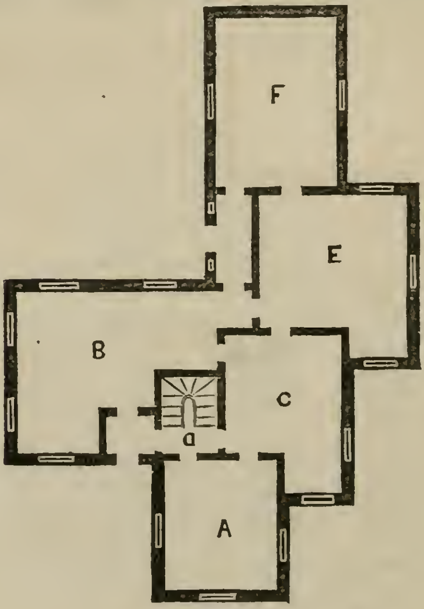
No. 87.

objection made to houses without projections, that they are wanting character.



No. 88.

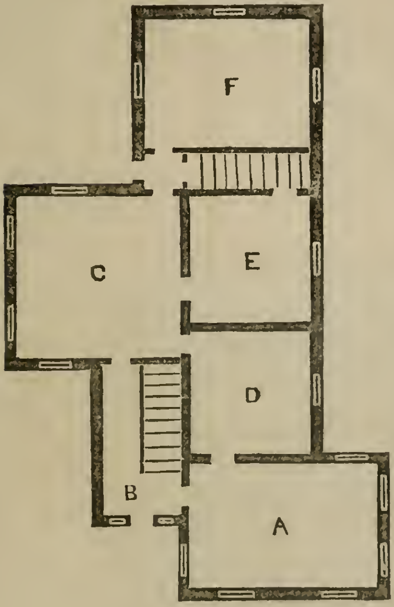
No. 88 is a plan varying in some respects from any of the preceding. A, parlor; B, kitchen or living room; C and D, bedrooms



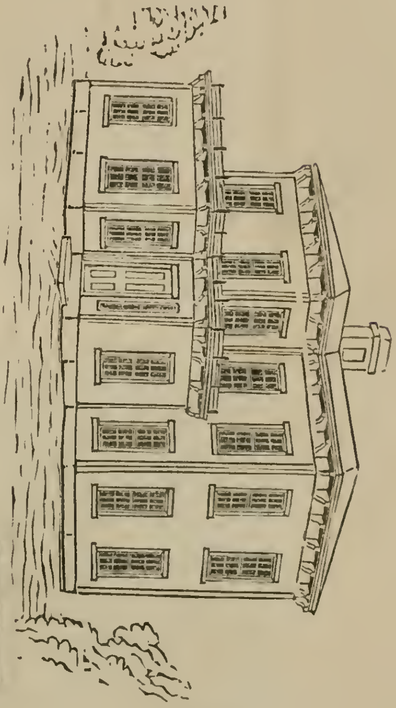
No. 89.

with closets; E, pantry. The upper portion should have two rooms, with store and closet rooms.

No. 89 is an irregular plan, acceptable to many persons. A, parlor; B, living room; C and E, bedrooms; D, hall; F, summer kitchen.



No. 90.



No. 91.

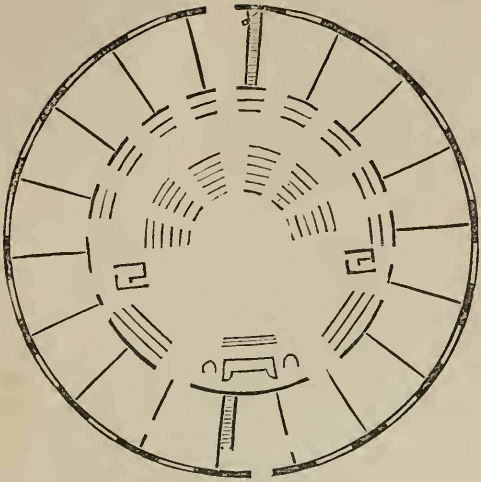
No. 90 is another dissimilar plan. A, parlor; B, hall; C, second parlor; F, kitchen; D and E, bedrooms.

No. 91 is the upright of No. 94.

No. 92 is a proposed plan of a Court House with offices, over which is a gallery amply provided with windows to light the whole interior, though the plan proposes skylights.

No. 93 is an old-fashioned homestead; the ground plan is No. 95.

No. 94, A is parlor; B, living room; C, bedroom; D, front hall; E, pantry; F, summer kitchen.

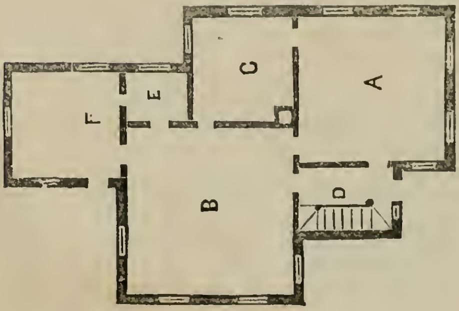


No. 92.

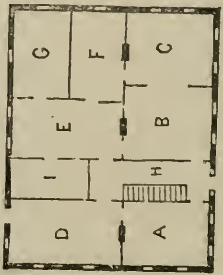
Plans of a similar form to this will answer well for hotels, water-cure establishments, or any similar public resorts, having a different inside arrangement.

H. WOODWARD, DEL.
F. HEDGE SC.

No. 93.



No. 94.



No. 95.

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